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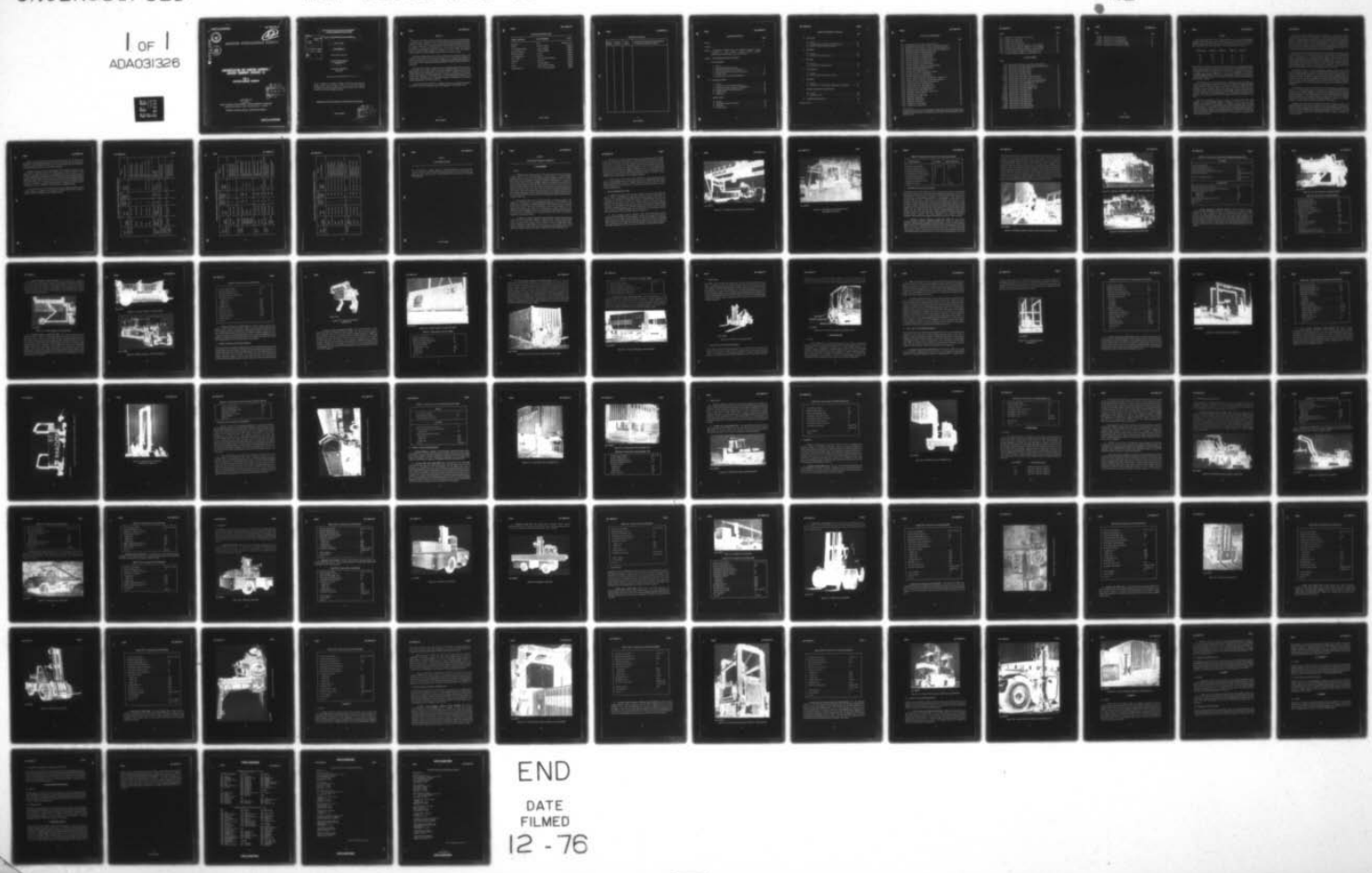

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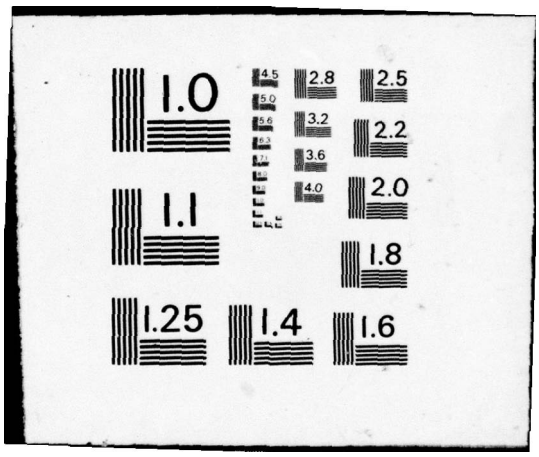
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DEFENSE INTELLIGENCE AGENCY

CONTAINERIZATION AND HANDLING EQUIPMENT— EURASIAN COMMUNIST COUNTRIES (U)

PART II
CONTAINER-HANDLING EQUIPMENT

PREPARED BY
US ARMY
ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
FOREIGN SCIENCE AND TECHNOLOGY CENTER

UNCLASSIFIED

(6) # CONTAINERIZATION AND HANDLING EQUIPMENT– EURASIAN COMMUNIST COUNTRIES (U)

PART II: CONTAINER-HANDLING EQUIPMENT (9)

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PREFACE

This study is intended to provide US military planners and research and development organizations with a comprehensive analysis and detailed description of significant Eurasian Communist countries' advances in cargo containers and container-handling equipment. This is a two-part study: Part I, Container Systems (AST-1150S-100-76), discusses containers and presents a 5-year forecast reflecting future civilian and/or military developments; Part II, Container-Handling Equipment, describes the various civilian and military equipment used for container handling and also includes a 5-year forecast.

Specifically excluded from the overall study are discussions of transport vehicles of all modes, the site-restricted portal cranes, and equipment for "stuffing" and "stripping" of containers. Information on surface transport equipment and materials handling equipment can be found in the Foreign Materiel Catalogs (FOMCAT), TB-381-5-22B and TB-381-5-19, respectively.

The scope of this product encompasses container-handling equipment that ranges from small auxiliary units to large, mobile, gantry-type equipment. Lifting capacities of the apparatus range from approximately 1 to 30 tonnes. Types of equipment covered include container-lifting jacks, self-loader transporters, container stacker-transporters, container portal cranes, sideloaders, and forklift trucks. The ECC-manufactured sideloaders and forklift trucks described were not specifically designed for handling the International Standards Organization (ISO)-type containers.

Constructive criticisms, comments, or suggested changes are encouraged and should be forwarded to the Defense Intelligence Agency, Washington, DC 20301 (ATTN: DT).

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Summary

The Eurasian Communist countries' (ECC) capability in the area of container-handling equipment, particularly equipment compatible with the four standard-type International Standards Organization (ISO) containers, is generally behind that of the free world. The following table provides a general description of the four basic ISO-type containers:

Container Type	Length (m)	Width (m)	Height (m)	Capacity (t)
1A	12.2	2.4	2.4	30
1B	9.2	2.4	2.4	25
1C	6.1	2.4	2.4	20
1D	3.0	2.4	2.4	10

East Germany is the only ECC that has made significant advances in designing and building various types of equipment to handle the ISO containers. The remaining ECC have either exerted a limited effort to develop a certain type of device or are relying on other countries to supply the necessary apparatus to meet their requirements for ISO-type container-handling equipment. Information on the equipment used by ECC military forces to handle the ISO-type containers is extremely limited (and considered a major intelligence gap for all ECC countries).

If ECC military forces are presently using or planning to adopt the ISO-type 1C container as their standard container, they have two types of equipment capable of handling it in the field. One device that appears to satisfy this requirement most effectively is the self-loader container transporter, with a rated capacity of 20 tonnes. These self-loaders, mounted on trailers towed by a truck tractor, provide a high mobility potential for forward areas. The other option is container-lifting jacks, with lifting capacities ranging from 20 to 30 tonnes. These jacks would be ideal for off-loading containers from semitrailers in the field.

The order in which the countries are covered in this study reflects their overall capability in container-handling equipment technology. In many cases, the model designators of ECC-produced devices depict certain equipment characteristics such as lifting capacity, number of tires, or number of axles. This system of model designation, used on all types of equipment, is explained in the specific equipment descriptions wherever possible. A total of 36 examples of ECC container-handling equipment are identified in detail in this study, and 32 items (with their basic characteristics) are incorporated in a comparison table at the end of this summary.

East German container-handling equipment technology is comparable to the most modern Western technology in the self-loader and auxiliary-equipment areas. Most of their equipment is designed primarily to handle the type 1C container and has an average lifting capacity of 20 tonnes. All their container-handling equipment originally was developed by the civilian sector for civilian use. Most of it was designed to operate on prepared surfaces and is not suitable for military use in the field. The only equipment currently produced in the civilian sector that could be adopted by the military for handling ISO-type containers in the field are the self-loader transporter and the container-lifting jacks.

Czechoslovakia ranks second to East Germany in the development of equipment suited for handling the various sizes of ISO containers. The Czechoslovaks have concentrated their efforts on the gantry type of container-handling equipment. All gantry-type container cranes are self-propelled and have lifting capacities ranging from 11 to 30 tonnes. The Czechoslovaks also produce a technically advanced self-loader transporter similar to the East German model. The Czechoslovak model can handle the type 1C container and has a maximum lifting capacity of 20 tonnes. They have also developed a set of container-lifting jacks with military potential (with a combined lifting capacity of 30 tonnes).

Soviet efforts in the area of container-handling equipment appear to be directed toward developing apparatus capable of handling their small-capacity containers (1 to 5 tonnes), which are still in wide use in the Soviet Union. They are presently using to an increasing extent ISO containers of various sizes, but their self-loader transporter is the only device of Soviet origin with known capability to handle ISO-type containers. The Soviets are currently relying on other Communist countries and free world countries to supply the necessary equipment to meet their increasing needs for apparatus that can handle containers of this type.

The Bulgarians are known to lead the ECC in the development and production of various sizes of forklift trucks (and are exporting them to approximately 60 countries). Except for some auxiliary equipment, they have not attempted to develop and build specialized equipment for handling the ISO-type containers. The Bulgarians have developed and are producing a set of container-lifting jacks with field-use potential. In addition, Bulgaria has been granted a license by the United Kingdom to produce three different models of a container stacker-transporter developed by a UK company.

Hungary is presently known to be using the type 1C ISO container, but they are not building equipment of their own to handle these containers. Hungary's increasing use of ISO-type containers outpaced their capability to develop and build equipment to handle them. As a result of their deficiencies in the handling equipment, they were forced to turn to free world sources (mainly the United Kingdom and West Germany) to purchase the necessary apparatus.

Poland is also using ISO-type containers, predominantly the type 1C. They are not developing container-handling equipment of their own; instead, they are also relying primarily on other Communist countries and free world countries (the United Kingdom, Italy, Japan, and East Germany) to meet these requirements.

Yugoslavia, Romania, and the People's Republic of China (PRC) are all known to be using ISO-type containers; however, only limited data on specific activities in these countries are available. Yugoslavia also is relying primarily on other countries to meet its container-handling equipment requirements. The Romanians are producing traveling cranes capable of lifting 35 tonnes. They are also known to be manufacturing sideloader vehicles and forklift trucks, but the capacities of these devices are currently unknown. Limited information is available on container-handling equipment employed by the PRC; however, the Chinese are known to manufacture some portal cranes of indigenous design.

The overall confidence level of this study, based on data availability and the analytical methods utilized, is estimated to be 80%. The confidence level for East Germany is estimated to be 90%, the highest for any individual country.

Characteristic Comparison of Container-Handling Equipment

Classes of Equipment	Model Designators	Country of Origin	Maximum Lifting Capacity (t)	Maximum Lifting Height (mm)	Container Type Handled	Remarks Description/Application
Self-loaders	CKS 20000	East Germany	20	?	1C	Self-loader mounted on semitrailer/depot, highway, field
	BNK-20	Czechoslovakia	20	?	1C	Self-loader mounted on semitrailer/depot, highway, field
	A-706	Soviet Union	20	?	1C	Self-loader mounted on semitrailer/depot, highway, field
	5911	Soviet Union	5	?	Gross 5 t or less	Small Soviet containers/highway, field
	A-825	Soviet Union	1.3	?	Gross 1.3 t or less	Small Soviet containers/highway, field
Container-lifting jacks	LCH 6500	East Germany	22	1700	1C, 1D	/depot, field
	9800	Bulgaria	20	1700	1C, 1D	/depot, field
	MPS 75-02	Czechoslovakia	30	1775	1B, 1C, 1D	/depot, field
Lift truck container transporter	RNC 20000	East Germany	20	70	1B, 1C, 1D	Requires a prime mover vehicle/depot use only
Container transporter	WAC 20002	East Germany	20	N/A	1C	This transporter has no self-loading capability; requires a prime mover vehicle/depot, highway, field

Characteristic Comparison of Container-Handling Equipment (Continued)

Classes of Equipment	Model Designators	Country of Origin	*Maximum* Lifting Capacity (t)	*Maximum* Lifting Height (mm)	Container Type Handled	Remarks Description/Application
	WFC 20001	East Germany	20	250	1C, 1D	Requires a prime mover vehicle/depot use only
	CSW 20	East Germany	20	?	1C	Requires a prime mover vehicle/depot use only
Container stacker-transporter	DCS 20002	East Germany	20	?	1C	Self-propelled/depot use only
	DFT 20002 C1	East Germany	20	2900	1C	Self-propelled/depot use only
	Balkancar 3042CBB	Bulgaria	30.5	5820	1A, 1B, 1C	Self-propelled/port facilities, depot
	Balkancar 3043CBB	Bulgaria	30.5	7980	1A, 1B, 1C	Self-propelled/port facilities, depot
	Balkancar 3083CBB	Bulgaria	?	?	1A, 1B, 1C	Self-propelled/port facilities, depot
Portal cranes	PD-110	Czechoslovakia	11	6500	1C	Self-propelled/port facilities, depot
	PD-250	Czechoslovakia	25.5	8500	1C	Self-propelled/port facilities, depot
	PPK-30L	Czechoslovakia	30	1775	1B, 1C	Self-propelled/depot use only
Forklift trucks	DFG 6302	East Germany	6.3	3200	Gross 6 t or less	Small East German containers/port facilities, depot, field
	Desta DVHM-12522	Czechoslovakia	12.5	3500	1D	Port facilities, depot
	4008	Soviet Union	10	4500	Gross 10 t or less	Small Soviet containers/port facilities, depot, field

Characteristic Comparison of Container-Handling Equipment (Continued)

Classes of Equipment	Model Designators	Country of Origin	Maximum Lifting Capacity (t)	Maximum Lifting Height (mm)	Container Type Handled	Remarks Description/Application
	4045M	Soviet Union	5	4000	Gross 5 t or less	Small Soviet containers/port facilities, depot, field
	RT, M-4075	Soviet Union	5	4500	Gross 5 t or less	Small Soviet containers/port facilities, depot, field
	4025	Soviet Union	5	4500	Gross 5 t or less	Small Soviet containers/port facilities, depot
	4045	Soviet Union	5	4000	Gross 5 t or less	Small Soviet containers/port facilities, depot, field
	M-4006	Soviet Union	4.5	4190	Gross 4.5 t or less	Small Soviet containers/port facilities, depot, field
Sideloaders	Desta DBHM-12522	Czechoslovakia	12.5	?	1D	/Port facilities, depot
	4070	Soviet Union	10	3400	Gross 10 t or less	Small Soviet containers/port facilities, depot
	M-4065	Soviet Union	5	4000	Gross 5 t or less	Small Soviet containers/port facilities, depot
	4063	Soviet Union	3	4350	Gross 3 t or less	Small Soviet containers/port facilities, depot

PART I.

CONTAINER SYSTEMS

Part I of this study is a separate publication containing information on cargo containers, container networks, container manufacturing and repair plants, and control systems. The report short title number of Part I is AST-1150S-100-76, and the product is classified CONFIDENTIAL.

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PART II.

CONTAINER-HANDLING EQUIPMENT

A. EAST GERMANY

1. General

a. Historically, East Germany has been the leader among the Eurasian Communist countries (ECC) in the overall development and production of container-handling equipment for the various sizes of International Standards Organization (ISO) containers. Most mobile and towed equipment is designed to handle the standard type 1C, 6-meter, ISO container. Other items of container-handling equipment are designed to be used with the three remaining standard-size ISO containers: type 1D (3-meter), type 1B (9-meter), and type 1A (12-meter). Some of the large, mobile equipment built by the East Germans to handle the extremely large (9-meter and 12-meter) containers is probably being produced under special licenses from several of the UK developers of these large stacker-transporter units. Because large-capacity container-handling equipment can readily be purchased on the free world market, the Communist countries can avoid expensive research and development programs of their own.

b. The general trend in East Germany has been to concentrate efforts in the development and production of container-handling equipment for use primarily in the civilian sector, as opposed to developing equipment for the military forces. As a result, the armed forces were left with only one alternative: make the best possible use of the equipment developed in the civilian sector. This presents a problem, however, for the military forces when handling containers in the field, because most equipment developed in the civilian sector is designed for use on prepared surfaces rather than on rough terrain frequently encountered in the field.

c. In addition to apparatus especially designed and built to handle the various sizes of ISO containers, various other equipment is employed in the overall container-handling system (e.g., portal cranes, gantry cranes, construction cranes, and large-capacity truck cranes). Although the major objective of this study is to cover specially built mobile equipment designed to handle ISO containers, large-capacity fixed equipment (such as the gantry cranes found in port areas and railway transfer points) will be briefly discussed.

d. The ISO type 1C, 6-meter container is the one most widely used in East Germany, both by the civilian sector and the military. Unfortunately, limited information is available on the extent of overall use of ISO containers in the East German armed forces. The military services are known to be using specially built containers for shelters and medical units and for other purposes. Available photographs of some of these specially built containers indicate that they are equipped with built-on jacks to raise them high enough above the truck bed to facilitate loading and unloading. The primary advantage gained in equipping these containers with self-contained handling systems is that such a system eliminates the need for auxiliary container-handling equipment.

e. East Germany is the major developer and producer of large-capacity fixed and mobile container-handling cranes, such as those found at river harbors and seaports and inland container-transfer terminals. Available information indicates that the Takraf Industrial Association of East Germany is the primary developer and producer of these container-handling cranes.

2. Container-handling Gantry Cranes

a. Within the port areas of East Germany, handling of the ISO containers between ship and shore is accomplished by large-capacity portal and gantry cranes. When the containers are removed from the ships, they are either stored temporarily in the port areas or loaded onto rail flatcars or trailers for shipment to inland container terminals. The RW-40/25 traveling gantry crane (fig II-1), manufactured by the Takraf Industrial Association, is a typical gantry crane used in port areas and rail yards for container-handling operations. This gantry crane can handle ISO containers type 1A, 1B, 1C, and 1D weighing up to 30 tonnes. The RW-40/25 gantry crane is primarily used for transloading containers between rail flatcars, trailers, and mobile-container transporters.

b. The telescoping container spreader, model SEHT-VC-40/20/10 (fig II-2), produced by VEB Verlade und Transportanlagen, Leipzig, has a maximum lifting capacity of 30 tonnes and can handle container types 1A, 1C, and 1D. In addition to transloading single containers, it can simultaneously transload two joined 3-meter containers, which can then be transported as one single unit. The model designator indicates that the equipment can handle containers 3 meters (10 ft), 6 meters (20 ft), and 12 meters (40 ft) in length.

Neg. 518371

Figure II-1. Traveling gantry crane, Takraf, model RW-40/25

Neg. 518433

Figure II-2. Telescoping container spreader, Takraf, model SEHT-VC-40/20/10

Table II-I. Characteristics of Gantry Crane and Container Spreader

Model Designator	RW-40/25	SEHT-VC-40/20/10
Container types handled	1A, 1C, 1D	1A, 1C, 1D
Maximum lifting capacity (t)	30	30
Hoisting speed, loaded (m/min)	38	?
Hoisting speed, unloaded (m/min)	76	?
Traveling speed of unit (m/min)	45	?
Maximum lifting height (m)	9.5	?
Spreader moving speed (m/min)	?	2.4
Weight of unit (kg)	?	11 350

3. Self-loading Container-stacker Transporter

Self-loading container-stacker transporters can be classified in two categories: self-propelled equipment and apparatus towed by prime movers. The East Germans are known to excel in the development and production of this type of equipment. The efficient utilization of storage space in container-handling operations (i.e., the capability to stack containers two and three high) has been a major factor in the development of these devices. This equipment, usually employed in port areas, rail yards, and industrial facilities, can load containers on trailers and rail flatcars and unload them. Self-propelled equipment usually can stack containers two high. The only East German equipment with three-high stacking capability has been imported from free world countries or manufactured under special license from free world countries. Most mobile container-handling equipment being developed and built by the East Germans is designed primarily to handle the standard ISO type 1C, 6-meter container. The only exception is the container transporter, model WFC 20001, which is also designed to handle the ISO type 1D, 3-meter container.

a. **Self-loader Container Transporter, Model CKS 20000.** The East German self-loader container transporter, model CKS 20000 (fig II-3, -4, and -5) is quite similar in appearance and technological capability to self-loaders built in the free world. The primary difference between free world-produced self-loaders (which use spreader devices that clamp onto the top of the container) and those produced in the ECC is that the ECC models employ cables to lift the containers. The use of cables allows more flexibility in the design of the lifting mechanism and also reduces the amount of material needed in the construction

of the lifting mechanism. Some of the models produced in the free world countries can hoist a container on one side of the trailer and lift it across the trailer bed onto another transporter. The model CKS 20000 does not have this capability, so it is ineffective for container-transloading operations. The CKS 20000 apparatus is mounted on a semitrailer, model HLS200.78/TK, which is towed by a truck tractor. This container-handling system is designed to handle the standard ISO container, type 1C, and has a maximum lifting capacity of 20 tonnes. Power to operate the self-loader's hydraulic lifting mechanism is provided by a 15-kW diesel engine mounted on the front of the trailer. The self-loader loads and unloads from the right side and normally is used to transport containers from container terminals to customers who do not have equipment at their facilities to off-load the containers. Containers may be loaded onto the CKS 20000 at container centers by means of a portal crane, with the transporter's lifting apparatus in the retracted position. The model designator indicates that the self-loader can lift a maximum load of 20 tonnes.

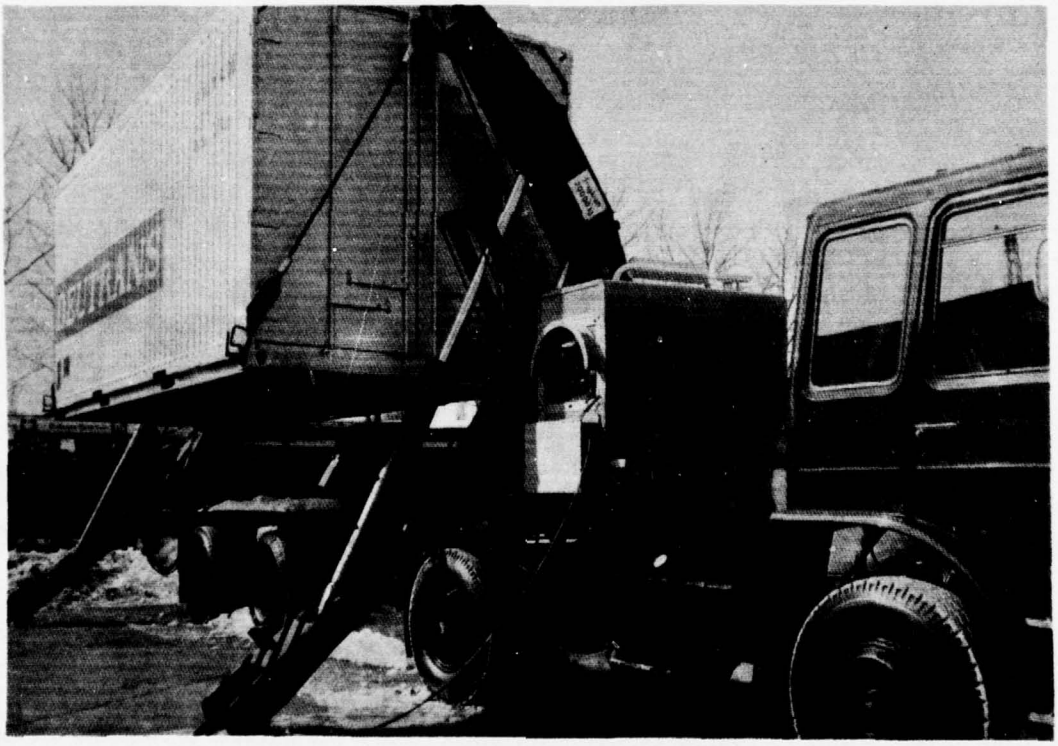

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Figure II-3. Self-loader container transporter, Takraf, model CKS 20000 (front)

Figure II-4. Self-loader container transporter, Takraf, model CKS 20000 (rear)

Figure II-5. CKS 20000 and trailer, model HLS200.78/TK

Table II-II. Characteristics of the Model CKS 20000 and HLS200.78/TK

CKS 20000	
Container type handled	1C
Maximum lifting capacity (t)	20
Lifting time, complete cycle (min)	2.5 to 3.0
Height of self-loader, transport position (mm)	3900
Powerplant (type/rating)	Diesel/15 kW @ 1500 r/min
Operation of lifting mechanism	Remote control via cables
HLS200.78/TK	
Maximum load capacity of trailer (t)	20
Maximum weight of trailer and self-loader mechanism (t)	9.3
Approximate dimensions of trailer:	
Length (mm)	7747
Width (mm)	2490
Height (mm)	1270
Maximum towing speed of trailer (km/h)	80
Tires (number)	8
Tire size	?

b. **Container Transporter, Model DFT 20002 C1.** The East German container transporter, model DFT 20002 C1 (fig II-6), a self-propelled unit capable of stacking containers two high, is designed to handle the standard ISO container, type 1C. This transporter has a maximum lifting capacity of 20 tonnes and is usually employed in port areas, rail yards, and industrial facilities. In addition to its ability to stack containers, it can also load containers on trailers and rail flatcars and unload them. The DFT 20002 C1 is a front-drive vehicle powered by a diesel engine. The model designator indicates that the container transporter can lift a maximum load of 20 tonnes and can handle the type 1C ISO container.

Neg. 516973

Figure II-6. Container transporter, model DFT 20002 C1

Table II-III. Characteristics of the DFT 20002 C1

Container type handled	1C
Maximum lifting capacity (t)	20
Maximum lifting height (mm)	2900
Lifting speed (m/min)	5.5
Vehicle travel speed (km/h)	20
Height of unit at stacking (mm)	5750
Height of unit at transporting (mm)	4500
Dimensions of vehicle:	
Length (mm)	9420
Width (mm)	5235
Height (mm)	?
Vehicle turning radius (mm)	7800
Powerplant (type/rating)	Diesel/110 kW
Tires (number)	6
Tire size	?
Lateral adjustment of container (mm)	±250
Longitudinal inclination of container (°)	2.8

c. **Container Transporter, Model DCS 20002.** Another device similar in appearance to the DFT 20002 C1 is the container transporter, model DCS 20002 (fig II-7), probably an earlier version of the DFT 20002 C1. This container transporter can also stack containers two high and is designed to handle the standard ISO container, type 1C, with a maximum weight of 20 tonnes. The technical characteristics of the DCS 20002 are currently unavailable; however, since this is an older model, the data would be useful only for comparison with the DFT 20002 C1.

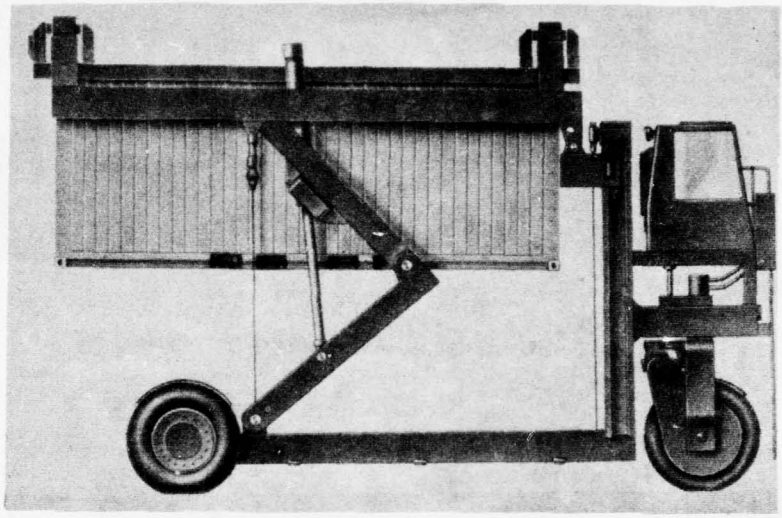

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Figure II-7. Container transporter, model DCS 20002

d. **Container Transporter, Model WFC 20001.** The container transporter, model WFC 20001 (fig II-8 and 9), is a nonself-propelled transporter that must be towed by a prime mover once a container has been loaded. This device, designed to handle the type 1C and 1D ISO containers, has a maximum lifting capacity of 20 tonnes; however, it cannot stack containers. The WFC 20001 was initially designed for movement of containers within industrial facilities once the containers have been delivered by train or truck. Its hydraulic lifting mechanism can be operated by a manual pump (or by a pressurized system when coupled to the prime mover). When the manually operated hydraulic pump is used, approximately 2 minutes are required to lift a container into the transport position. If the prime mover's power-operated hydraulic system is connected to the transporter, a container can be lifted in 10 to 20 seconds.

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Figure II-8. Container transporter, model WFC 20001

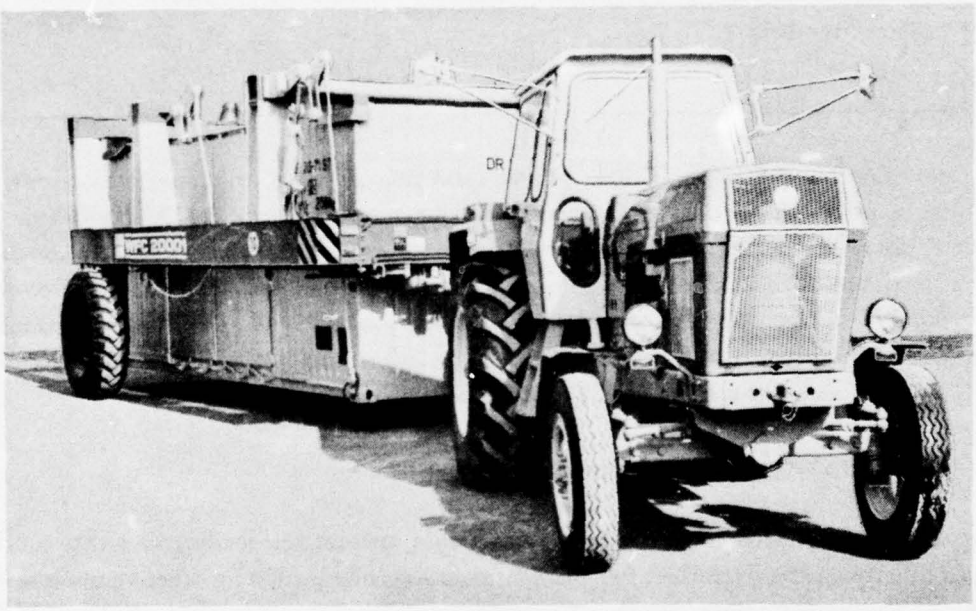

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Figure II-9. Container transporter towed by ZT 304 tractor

Table II-IV. Characteristics of the WFC 20001

Container types handled	1C, 1D
Maximum lifting capacity (t)	20
Maximum lifting height (mm)	250
Vehicle travel speed, towed (km/h)	10
Dimensions of vehicle:	
Length (mm)	7400
Width (mm)	4000
Height (mm)	2935
Wheelbase (mm)	5600
Wheel track (mm)	3625
Axle load, front (kg)	8500
Axle load, rear (kg)	16 300
Weight of vehicle (kg)	4820
Tires (number)	4
Tire size	?

e. **Container Stacking Truck, Model CSW 20.** Another container transporter that requires a prime mover is the container stacking truck, model CSW 20 (fig II-10). This vehicle, designed for lifting, stacking, and transporting the standard type 1C ISO container, has a maximum lifting capacity of 20 tonnes. The CSW 20 is primarily employed to move containers in storage areas and industrial facilities. Power to operate its hydraulic system is supplied by the prime-mover vehicle. The East German-manufactured forklift truck, model DFG 6302, generally is used as the CSW 20's prime-mover vehicle.

4. Container Transporters and Auxiliary Equipment

This section deals with container transporters that are not self-loading and that must be towed by prime-mover vehicles after the container has been loaded by other equipment. The auxiliary equipment consist mainly of portable apparatus, such as jacking devices, that are placed at the corners of the container to lift it from the trailer. Also included in the auxiliary equipment category are devices with wheels that clamp onto the ends of the containers and lift them high enough to allow for transport by manual or mechanical means.

Neg. 517249

Figure II-10. Container stacking truck, model CSW 20

a. **Container Transporter, Model WAC 20002.** The container transporter, model WAC 20002 (fig II-11), is a three-axle trailer designed to carry the type 1C ISO container, with a maximum weight of 20 tonnes. This container transporter is primarily designed for the movement of containers in industrial facilities. The WAC 20002 has no self-loading capability and requires a prime-mover vehicle to move the transporter once the container has been loaded onto the transporter. The transporter is equipped with a combined hydraulic actuation with compressed-air assist brake and a mechanical screw brake. Once a container is loaded onto the transporter, the container can be secured manually with mounting bolts. Special versions of the WAC 20002 have been fitted with lights so that they can use public highways.

Neg. 519875

Figure II-11. Container transporter, model WAC 20002

Table II-V. Characteristics of the WAC 20002

Container type handled	1C
Maximum carrying capacity (t)	20
Vehicle travel speed, towed (km/h)	25
Vehicle turning radius (mm)	500
Dimensions of vehicle:	
Length (approx) (mm)	7000
Width (mm)	2500
Height (mm)	850
Tires (number)	12
Tire size	?

b. **Lift Truck Container Transporter, Model RNC 20000.** The lift truck container transporter, model RNC 20000 (fig II-12), is a nonself-propelled unit consisting of two identical lifting devices attached to ends of the container. When the container is lifted, it forms a complete unit with the two lifting devices and can then be towed by a prime mover. The RNC 20000 can handle the 1B, 1C, and 1D standard-type ISO containers and has a maximum lifting capacity of 20 tonnes. (The US Army has a similar device, which was developed primarily to transport mobile shelters in the field, so this is not considered a new technology.) This East German container-handling unit was basically designed for use in industrial facilities and warehouses; its ability to operate in areas with limited space was a major design factor. The RNC 20000 is equipped with a brake system attached to the prime-mover vehicle and activated by a compressed-air system. The container can be lifted manually or mechanically, but if the mechanical method is to be used, the necessary power must be furnished by the prime-mover vehicle.

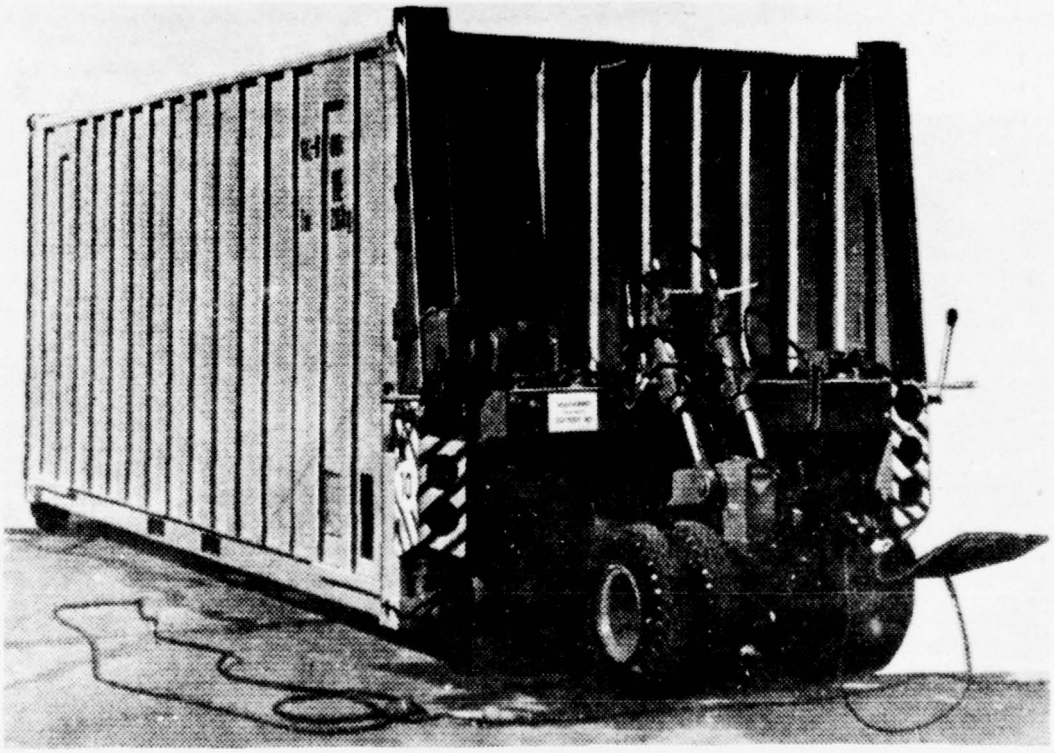

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Figure II-12. Lift truck container transporter, model RNC 20000

Table II-VI. Characteristics of the RNC 20000

Container types handled	1B, 1C, 1D
Maximum lifting capacity (t)	20
Vehicle travel speed, towed (km/h)	10
Maximum lifting height (above surface) (mm)	70
Required lifting time (manual) (min)	6.5
Required lifting time (mechanical) (s)	35

c. **Container-lifting Jacks, Model LCH 6500.** The container-lifting jacks, model LCH 6500 (fig II-13), are designed for loading containers on trailer transporters and unloading them. These jacks are placed at the corners of the container, and by means of hydraulic pressure, they can lift a container to a maximum height of 1700 mm. The four jacks, with a combined lifting capacity of approximately 22 tonnes, are operated from a remote console that also provides the power to operate the hydraulic system.

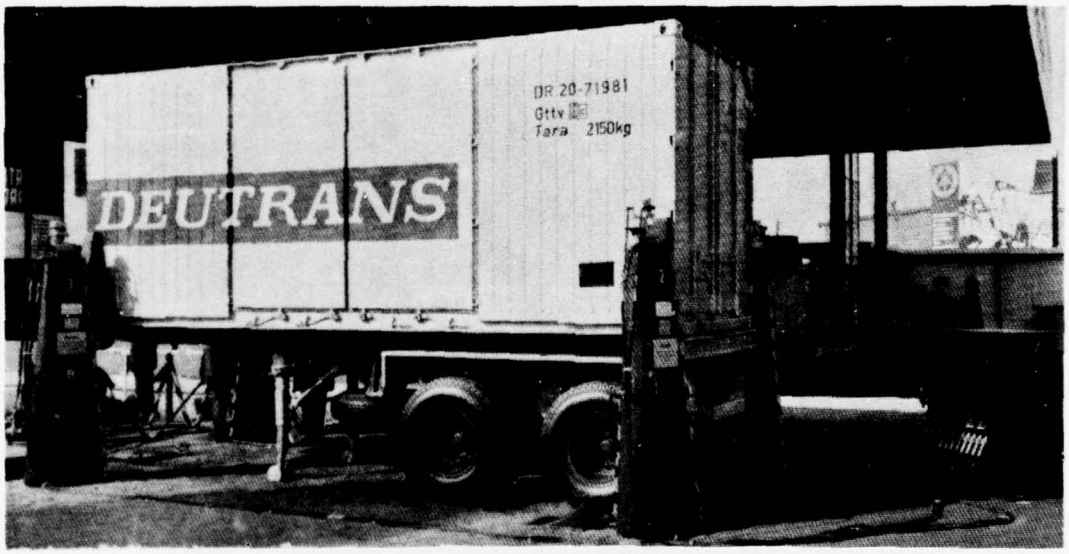

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Figure II-13. Container-lifting jacks, model LCH 6500

5. Forklift Trucks

Most forklift trucks developed and produced by the East Germans lack sufficient size or capacity to handle the various sizes of ISO containers. They are not building any forklift trucks capable of handling fully loaded ISO containers; however, they can readily purchase such equipment from the United Kingdom. The model DFG 6302 (fig II-14) is the only forklift truck in the current inventory of East German materials-handling equipment with a container-handling capability. This vehicle has a maximum lifting capacity of 6300 kg and a maximum lifting height of 3200 mm. The DFG 6302 is used primarily for handling empty containers in storage areas and as a prime mover for towing some of the nonself-propelled container transporters.

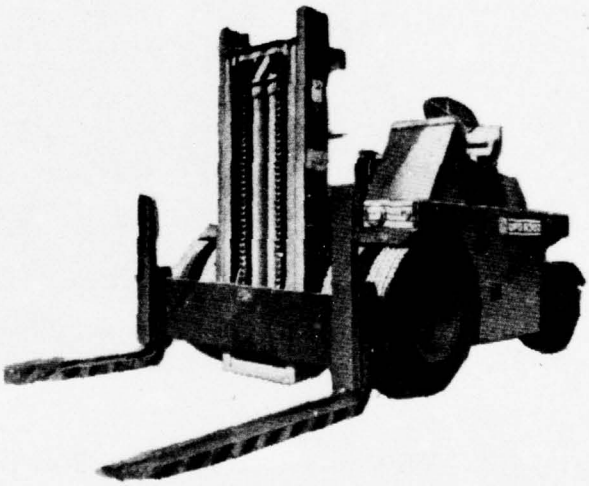

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Figure II-14. Forklift truck, model DFG 6302

6. Container Self-contained Lifting Equipment

Some container units have built-on equipment that is actually part of the container itself and that is used to lift the container from the transport vehicle. At present, this apparatus seems to be employed to a limited degree, primarily on containers modified for special purposes (such as medical vans). The obvious advantage of such a system is that it eliminates

the need for any type of auxiliary handling equipment to remove the container from the transporter. Figure II-15 shows such a system currently in use by the East German armed forces; however, technical data on the built-on lifting equipment are currently unavailable.

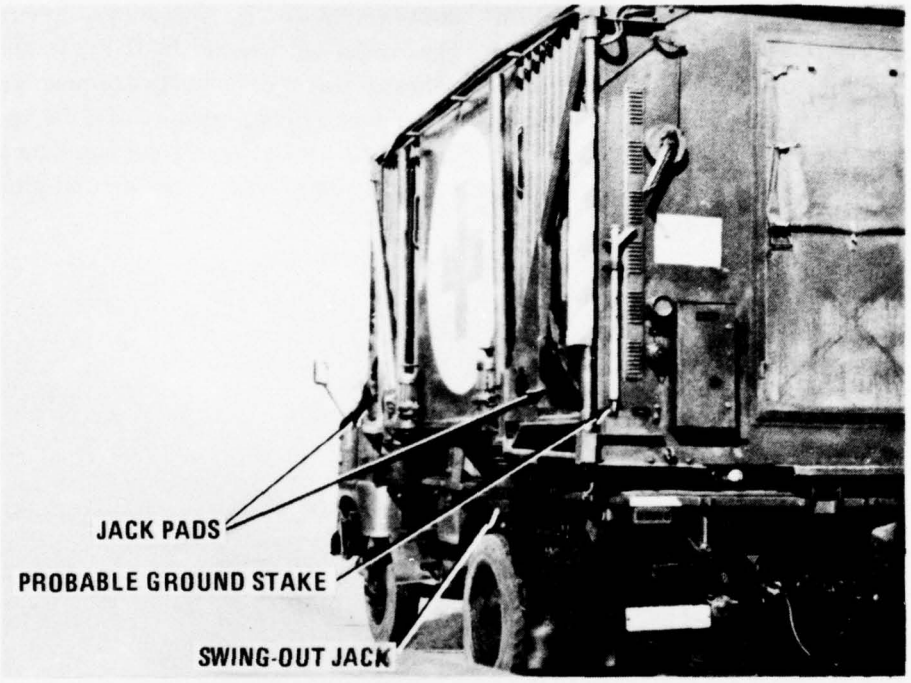

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Figure II-15. Left side view, medical van with built-on jacks

B. CZECHOSLOVAKIA

7. General

a. Czechoslovakia ranks second to East Germany in the overall area of specialized equipment designed for container-handling operations. Their efforts appear, however, to be concentrated in the development of gantry-type container-handling equipment and sideloaders capable of handling the small ISO container (type 1D). In the area of forklift trucks, the Czechoslovaks have a very limited capability for container-handling operations. They recently developed a self-loader container-transporter similar to the East German model CKS 20000. In the category of auxiliary container-handling equipment, the Czechoslovak effort has yielded only one product, a set of container-lifting jacks.

b. Within Czechoslovakia, the most commonly used ISO container appears to be the standard type 1C. Most of their container-handling equipment appears to be designed to handle this container. This equipment is limited to items such as self-loader container transporters, gantry-type apparatus, and auxiliary devices. Other equipment not specifically designed for container-handling operations include forklift trucks and sideloaders. Existing forklift trucks and sideloaders currently produced in Czechoslovakia can handle only the smallest of the ISO containers, the type 1D.

c. No definite information presently exists to indicate that the Czechoslovak armed forces are using the ISO type 1C container; however, this container would be practical because the East Germans (and possibly the Soviets) are known to be employing it. If this container is in military use in Czechoslovakia, the recently developed self-loader container transporter would be the most suitable handling equipment, particularly in the field, where mobility becomes a significant factor. A major consideration is that most container-handling equipment is designed and developed in the civilian sector, intended for use on prepared surfaces. The armed forces are thus left with almost no choice but to adopt the equipment developed in the civilian sector even though mobility requirements in the military are greater. The only type of container-handling equipment developed in the civilian sector that is also suitable for military use is the self-loader container transporter and auxiliary container-handling equipment, such as jacks. The jacks can be used to lift fully loaded containers from trailers that are towed into the field by truck tractors.

8. Gantry-type Container-handling Equipment

The Czechoslovaks are the leader among the Communist countries in the development and production of the gantry-type container-handling equipment. Most of this type of equipment appears to be designed primarily to handle the standard type 1C ISO container, weighing approximately 20 tonnes. These gantry container transporters are self-propelled units designed to operate on level, prepared surfaces in port areas and at container transfer points. They are primarily used to transfer containers between rail flatcars and trailer transporters; they can also lift containers from the ground onto transporters.

a. **Container Portal Crane, Model PD-110.** The container portal crane, model PD-110 (fig II-16), is probably the first model in this series of equipment to be developed and built in Czechoslovakia. Designed to handle the standard-type ISO 1C container, it has a

maximum lifting capacity of 11 tonnes. This portal crane is primarily employed in transloading containers in port areas and at inland container terminals. The PD-110 is equipped with pneumatic tires on all four corners of the vehicle and is propelled by dual hydraulic-powered motors located at the rear of the vehicle. The model designator indicates that the crane can lift a maximum weight of 11 tonnes.

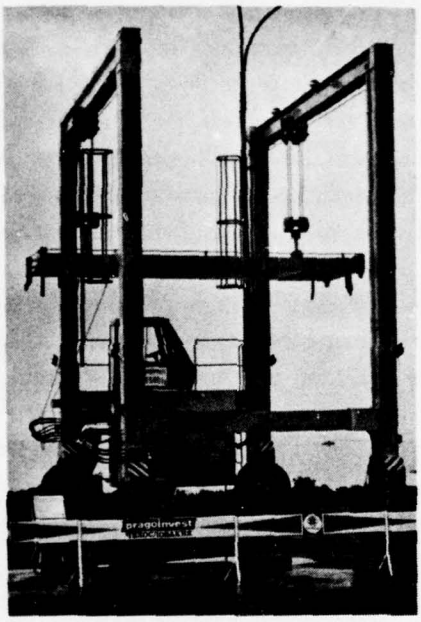

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Figure II-16. Container portal crane, model PD-110

Table II-VII. Characteristics of Container Portal Crane PD-110

Container type handled	1C
Maximum lifting capacity (t)	11
Maximum lifting height (mm)	6500
Lifting speed, with load (m/min)	11
Lifting speed, without load (m/min)	15
Vehicle travel speed (km/h):	
First gear	1.8
Second gear	3.2
Third gear	4.8
Fourth gear	5.9
Dimensions of vehicle:	
Height of portal (mm)	7895
Overall width of vehicle (mm)	10 900
Width of vehicle track (mm)	9850
Length of vehicle (mm)	5080
Wheelbase (mm)	4000
Turning radius (mm)	10 500
Weight of vehicle (kg)	14 500
Tires (number)	4
Tire size	?

b. **Container Portal Crane, Model PD-250.** Another container portal crane in the "PD" series is the model PD-250 (fig II-17), with a lifting capacity more than double that of the model PD-110. This newer model has a maximum lifting capacity of 25.5 tonnes and a maximum lifting height of 8.5 meters. The PD-250 can easily handle the type 1C ISO containers when they are loaded to their maximum permissible capacity. This portal crane would also be used in ports and at inland container terminals. The model designator indicates that the crane can lift a maximum weight of 25 tonnes.

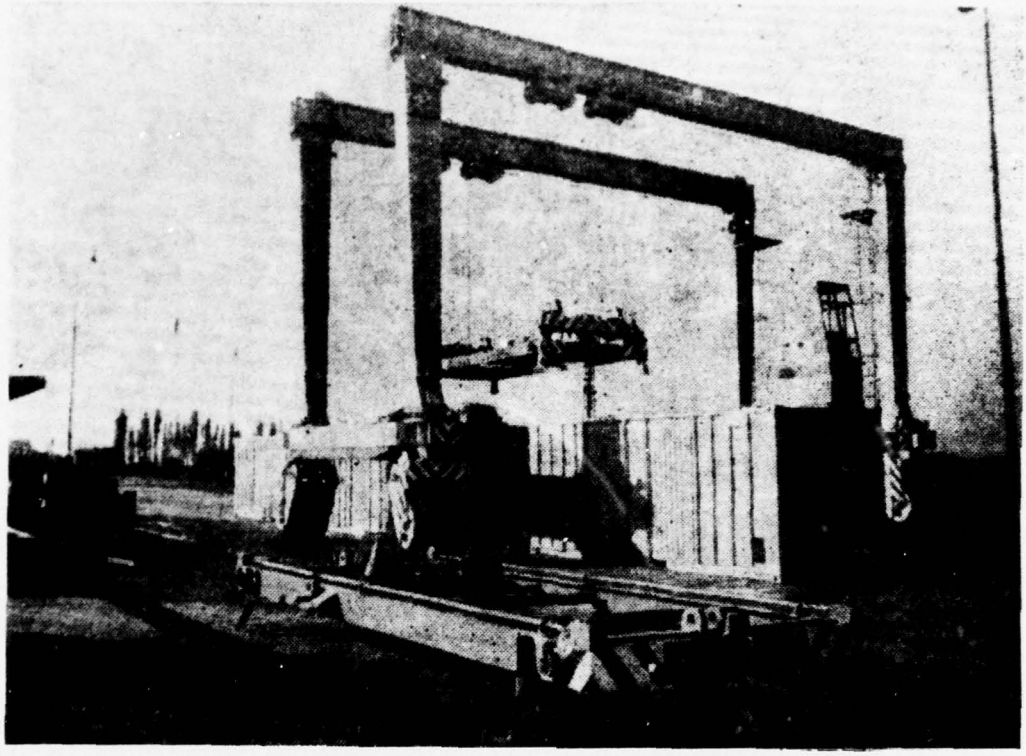

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Figure II-17. Container portal crane, model PD-250

Table II-VIII. Characteristics of Container Portal Crane PD-250

Container type handled	1C
Maximum lifting capacity (t)	25.5
Maximum lifting height (mm)	8500
Lifting speed (m/min)	4-9
Vehicle travel speed (km/h):	
First gear	2.9
Second gear	4.2
Third gear	5.9
Dimensions of vehicle:	
Height of portal (mm)	10 100
Overall width of vehicle (mm)	14 300
Width of vehicle track (mm)	13 150
Length of vehicle (mm)	6720
Wheelbase (mm)	?
Weight of vehicle (kg)	37.5
Tires (number)	8
Tire size	?

c. **Gantry Container Transloader, Model PPK-30L.** The gantry container transloader, model PPK-30L (fig II-18 and 19), consists of two separate units that straddle the container and simultaneously lift it into the transporting position. This container transloader can handle container types 1B and 1C and has a maximum combined lifting capacity of 30 tonnes. The unit is operated by a series of electric-powered motors controlled from a remote console, which also supplies the electricity. Because of its limited lifting and traveling speeds, this transloader normally would be employed only in areas with small-volume container-handling requirements.

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Figure II-18. Gantry container transloader, model PPK-30L, complete unit

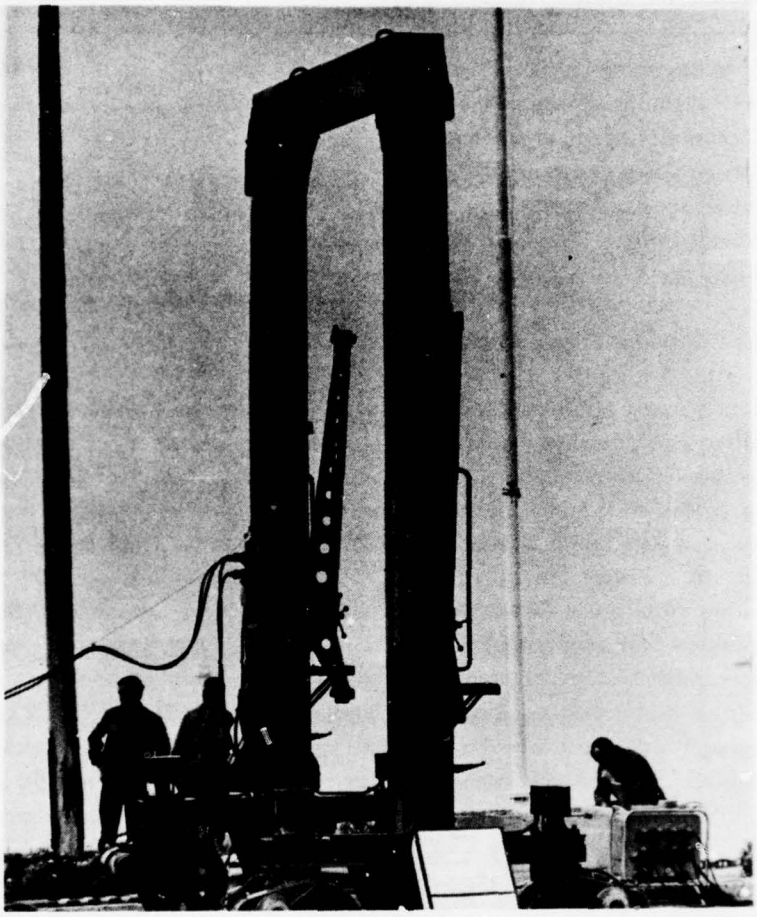

Figure II-19. Gantry container transloader, model PPK-30L, single unit

Table II-IX. Characteristics of Gantry Container Transloader PPK-30L

Container types handled	1B, 1C
Maximum lifting capacity (t)	30
Maximum lifting height (mm)	1775
Lifting speed (m/min)	0.5
Travel speed of unit (km/h)	0.2
Wheels (number)	8
Wheel size	?

9. Self-loader Container Transporter, Model BNK-20

a. Presently, one of the most promising developments to enhance the mobility of container-handling equipment is the Czechoslovak self-loader container transporter, model BNK-20 (fig II-20). This system consists of a dual set of cranes mounted on opposite ends of a trailer; using cables connected to the bottom corners of the container, it can load the container onto a trailer and unload it. The trailer is then towed by a truck tractor. Depending on the design of the crane apparatus mounted on the trailer, this container-handling system can be very versatile. Both the West German and Soviet models can lift a container from one mode of transport, across the trailer bed, onto another transport vehicle. Most self-loader container transporters can stack containers two high. Of all the container-handling equipment currently known to have been developed and produced in the ECC, the self-loader container transporter appears most adaptable for military use in the field. All ECC-produced equipment of this type is designed to handle the standard type 1C ISO container. The model designator indicates that the self-loader mechanism can lift 20 tonnes.

b. The model BNK-20 is the only self-loader container transporter known to be in current production in Czechoslovakia. This model is designed to handle the type 1C container and has a maximum lifting capacity of 20 tonnes. The self-loading unit, designated BNK-20, is mounted on a trailer type NK-30.087, which is towed by a Skoda 706 MTTN tractor. The BNK-20 is designed to load type 1C containers onto rail cars and other trailers, unload them, lift them from the ground, and stack them two high. Hydraulic power to operate the lifting mechanism mounted on the trailer is supplied by the prime-mover vehicle. The lifting mechanism is operated remotely by means of a portable control box which, by means of electrical power, controls the hydraulic system. Indications are that the BNK-20 probably will be adopted for use by the Czechoslovak military (fig II-20).

Neg. 519115

Figure II-20. Self-loader container transporter, model BNK-20

Table II-X. Characteristics of the Model BNK-20 and NK-30.087

BNK-20	
Container type handled	1C
Maximum lifting capacity (t)	20
Weight of lifting mechanism (t)	9
NK-30.087	
Maximum load capacity of trailer (t)	20
Maximum weight of trailer and self-loader mechanism (t)	14.5
Approximate dimensions of trailer:	
Length (mm)	8500
Width (mm)	2500
Height (mm)	1500
Tire size	18.00x22

10. **Auxiliary Container-handling Equipment**

a. **General Definition.** Auxiliary container-handling equipment includes smaller, more portable items, such as jacking devices that are placed at the corners of the container to lift it from the trailer. This type of equipment may prove to be one of the most feasible designs for the military to consider in satisfying its requirement to unload containers from trailers in the field when the trailers are not equipped with built-on handling devices.

b. **Container Lifter Truck, Model MPS 75-02.** Container lifter truck, model MPS 75-02 (fig II-21 and II-22), is the only jack-type device of its kind known to be in current production in Czechoslovakia. (The Czechoslovaks are also selling these types of container-handling jacks to the Soviets.) This set of four identical jacks can be used to lift an ISO container of any length, provided that the maximum weight of the container does not exceed 30 tonnes. The jacks are operated by electric motors, and the power and control is supplied from a remotely operated portable unit. Each jack has a maximum lifting capacity of 7.5 tonnes, resulting in a total combined lifting capacity of 30 tonnes. They are primarily designed for lifting containers from trailer transporters; when the container has been lifted clear of the trailer bed, the jacks can move the container to the storage area.

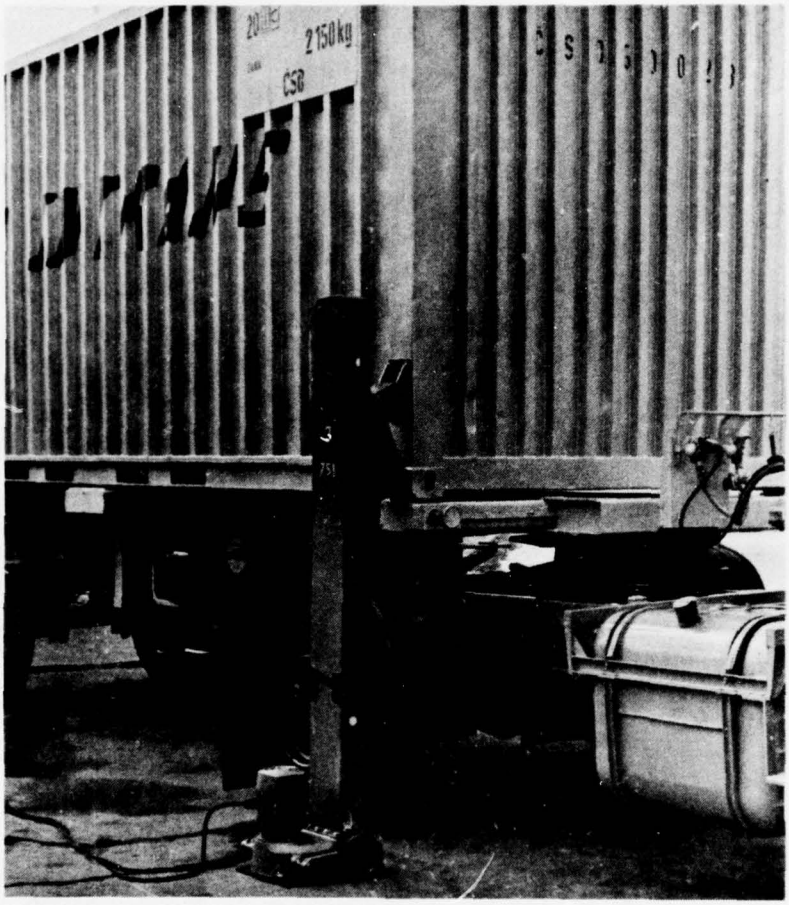

Figure II-21. Container lifter truck, model MPS 75-02

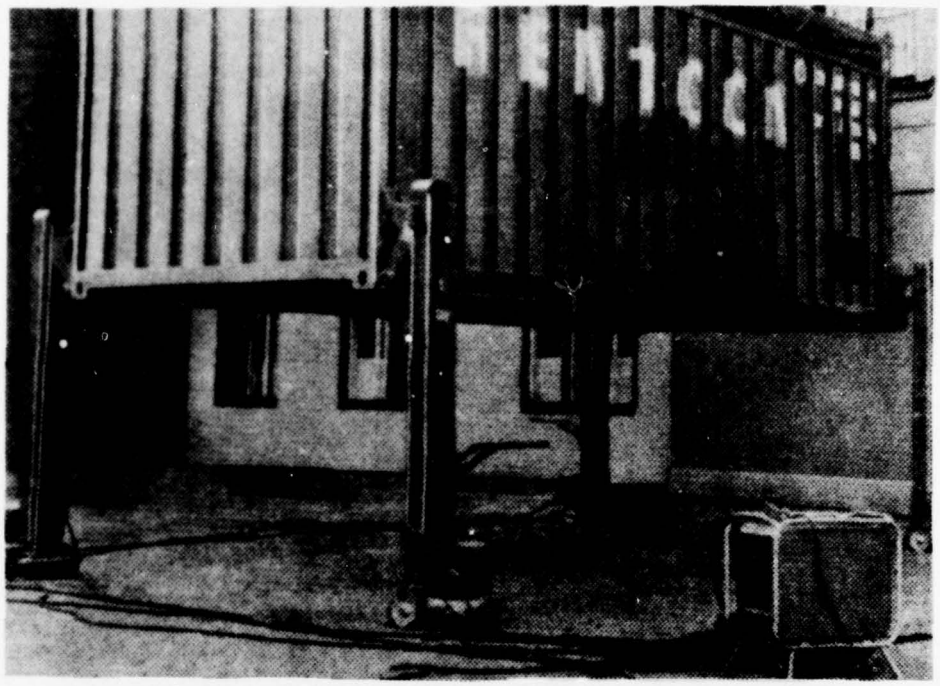

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Figure II-22. Container lifter truck, model MPS 75-02

Table II-XI. Characteristics of the Model MPS 75-02

Container types handled	1B, 1C, 1D
Maximum lifting capacity (t)	30
Maximum lifting height (mm)	1775
Maximum lifting speed (m/min)	0.5
Dimensions of jack:	
Length (mm)	1040
Width (mm)	560
Height (mm)	2330
Weight of jack (kg)	230

11. **Forklift Trucks**

a. **General.** Although Czechoslovakia ranks second to Bulgaria in the overall area of forklift truck development and production, very few Czechoslovak forklifts can handle large containers. Their requirements for large forklift trucks capable of handling ISO containers can be met only by purchasing such equipment from the free world market. Very little is known of the extent to which forklift trucks are used in Czechoslovakia to handle containers. With the ever increasing development of specialized equipment to handle the various sizes of ISO containers, the role of conventional forklift truck may diminish. Even if the Czechoslovak military forces are using the type 1C ISO container in the field, current information indicates that no forklift truck known to be in their inventory can handle this container.

b. **Forklift Truck, Model DVHM-12522.** The model DVHM-12522 (fig II-23) is the only Czechoslovak-produced forklift truck that can handle any of the ISO-type containers. This vehicle can move the smallest of the ISO-type containers, the type 1D, and has a maximum lifting capacity of 12.5 tonnes, as indicated by its model designation.

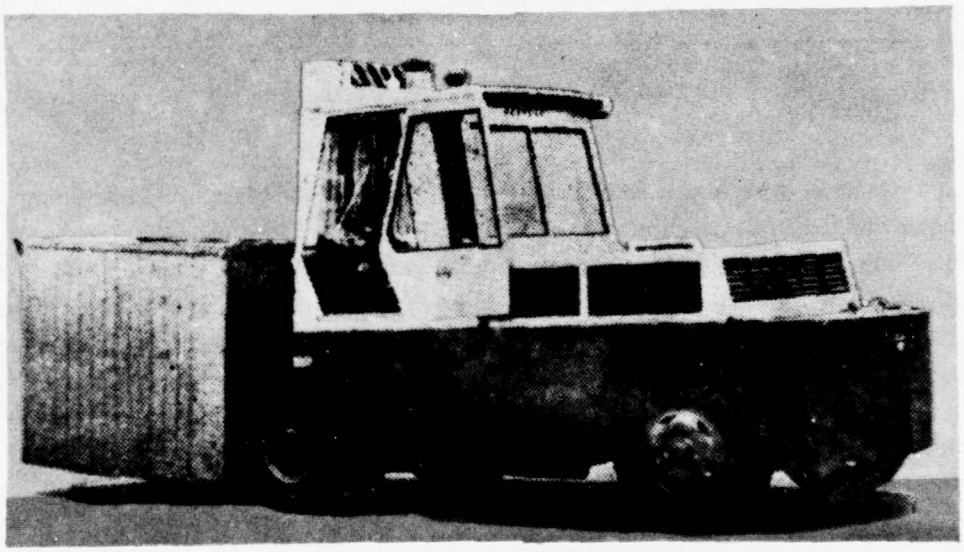

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Figure II-23. Forklift truck, Desta, model DVHM-12522

Table II-XII. Characteristics of the Model DVHM-12522

Container type handled	1D
Maximum lifting capacity (t)	12.5
Maximum lifting height (mm)	3500
Lifting speed, with load (m/min)	16
Lifting speed, without load (m/min)	18
Travel speed, with load (km/h)	8
Travel speed, without load (km/h)	30
Powerplant (type/rating)	Diesel/97 kW @ 2600 r/min
Tires (number)	6
Tire size	?

12. *Sideloaders*

a. **General.** Czechoslovakia is the leader among the ECC in developing and producing sideloaders. Czechoslovak sideloaders, however, are primarily designed for handling long, bulky-type materials such as lumber and pipes. Most of their sideloaders have a relatively limited maximum lifting capacity, thus reducing the capability to handle any of the ISO-type containers. Several free world countries specialize in producing large-capacity sideloader vehicles that can move the largest of the ISO containers, the type 1A; these vehicles have a maximum load capacity of 40 tonnes. The availability of free world equipment specifically designed to handle the ISO containers eliminates the need for the ECC to develop and build models of their own.

b. **Sideloader, Model DBHM-12522.** Only one current Czechoslovak sideloader, the model DBHM-12522 (fig II-24), can handle a standard-size ISO container. This model can move the smallest of the ISO containers, the type 1D, and has a maximum lifting capacity of 12.5 tonnes. It can also handle empty type 1C ISO containers.

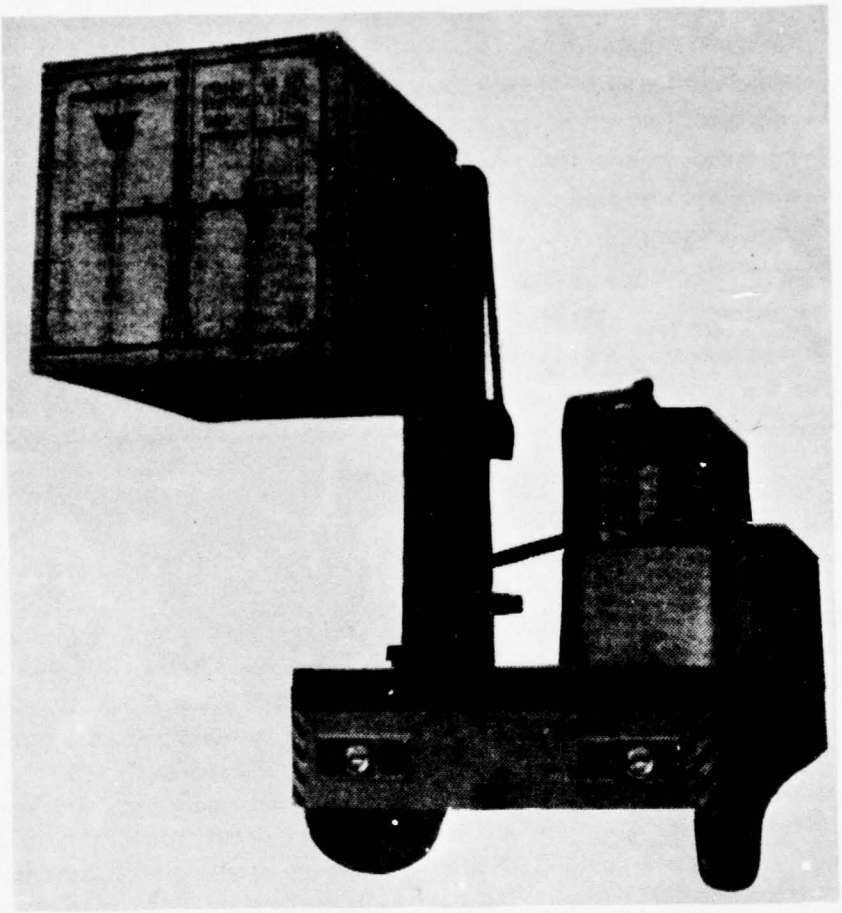

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Figure II-24. Sideloader, Desta, model DBHM-12522

Table II-XIII. Characteristics of the Model DBHM-12522

Container type handled	1D
Maximum lifting capacity (t)	12.5
Lifting speed (m/min)	14
Travel speed, without load (km/h)	40
Gradeability, with load (%)	20
Gradeability, without load (%)	25
Powerplant, rating	110 kW @ 1800 r/min
Tires (number)	6
Tire size	?

C. SOVIET UNION

13. General

a. The Soviet Union has not exerted any major efforts to develop specialized equipment to handle the various sizes of ISO containers, especially when compared to the East Germans, who currently lead the ECC in this area. Most Soviet-developed and -produced equipment can handle only the smaller-capacity containers not built to ISO standards. The only Soviet-built item capable of handling a standard-size ISO container is the self-loader container transporter, model A-706. This self-loader unit, which can move the standard type 1C ISO container, will be described in detail later in this section. The Soviets manufacture approximately 19 different sizes of small-capacity containers, with capacities ranging from 1.25 tonnes to 5 tonnes. Most of them are constructed of metal, but a few wooden containers are used. (Complete details on these containers are included in Part I of this study.) The containers have been grouped as follows to facilitate analysis and discussion:

Gross Weight	Maximum Dimensions
5 t	2600 mm x 2100 mm x 2400 mm
3 t	2100 mm x 1300 mm x 2400 mm
2.5 t	2100 mm x 1300 mm x 2400 mm
1.25 t	1640 mm x 1040 mm x 2000 mm

b. The Soviet Union relies heavily on other Communist countries and free world countries for equipment to handle most ISO-type containers they use, and current sources indicate that this trend will continue. The Soviets are known to have purchased a number of 38- and 54-tonne capacity sideloader container transporters from the UK firm, Lancer Boss, for use at the Vostochnyy seaport in Siberia. These sideloaders can easily handle the largest of the ISO containers, the type 1A, which is widely used in international shipment of goods. In 1973, the Soviets placed an order for US$6.5 million worth of container-handling equipment from the Japanese firm, Mitsui. This equipment, capable of handling approximately 70 000 containers a year, also was to be installed at the Vostochnyy seaport. The installation was scheduled for completion during 1975. During 1974, the Soviets negotiated a 5-year contract with a US firm to lease 100 container-carrying chassis for type 1C containers and 200 chassis for 1A containers.

c. Most equipment in the Soviet Union today was developed and built to handle the small-capacity containers designed and produced by the Soviets during the evolution of containerization of goods for within-country use. Although the bulk of this equipment has a maximum lifting capacity of less than 10 tonnes, it is adequate to handle their smaller-capacity domestically designed containers. The unavailability of domestic equipment to handle larger ISO containers—which are being used increasingly in the USSR—has forced them to purchase appropriate equipment from free world sources and other ECC (such as East Germany and Bulgaria).

d. Currently, the Soviets have four self-loader container transporters of domestic manufacture, but only one of these is designed for handling an ISO-type container. The remaining three are designed especially for the older, small-capacity, non-standard ISO-type containers. Some Soviet-produced forklifts and sideloaders, although not specifically developed to handle containers, can be used for this purpose.

e. Limited information is available on Soviet use of large containers in the military, particularly those of the ISO type (and more specifically, the type 1C, which is known to be used by the East German armed forces). If the Soviet armed forces are using the ISO type 1C container, the self-loader model A-706 is the only item in their equipment inventory capable of handling this container. The military is currently using domestically produced containers, which are older, have smaller capacity, and are not ISO standard. The three small-capacity self-loaders currently produced in the Soviet Union can handle certain sizes of these small containers, and these self-loaders are mobile enough for use in forward areas.

14. Self-loader Container Transporters

The Soviets appear to lead the other Communist countries in the overall area of self-loader mechanisms mounted on different types of truck chassis. With this wide variety of self-loader mechanisms suitable for use on various truck chassis, the Soviets probably have the best mobility potential for moving containers into forward areas.

a. **Self-loader Container Transporter, Model A-706.** The Soviet self-loader container transporter, model A-706 (fig II-25), is mounted on a semitrailer towed by a MAZ-515 truck tractor; it has a maximum lifting capacity of 20 tonnes. A unique feature of this self-loader is its ability to lift a container from one side of the trailer, across the trailer bed, to the other side. With this capability, this unit can be used in transloading operations, e.g., from rail flatcars to semitrailers. As previously stated, if the Soviet military is using the ISO type 1C container, the model A-706 is the only domestically produced self-loader capable of handling it. The model A-706, mounted on a semitrailer and towed by a MAZ-515 truck tractor, will give the Soviet military a high mobility capability for container-handling operations in the field.

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Figure II-25. Self-loader container transporter, model A-706

Table II-XIV. Characteristics of the Model A-706

Container type handled	1C
Maximum lifting capacity (t)	20
Lifting time, complete cycle, approx (min)	3
Dimensions of trailer:	
Length (mm)	8500
Width (mm)	2500
Height (mm)	1540
Height of lifting mechanism (mm)	4000
Weight of lifting mechanism and trailer (t)	9.8
Tires (number)	8
Tire size	?

b. **Self-loader Truck, Model 5911.** The self-loader truck, model 5911 (fig II-26), is designed to handle the Soviet-built small containers weighing up to 5 tonnes. The self-loader mechanism is mounted on the chassis of a MAZ-500 vehicle.

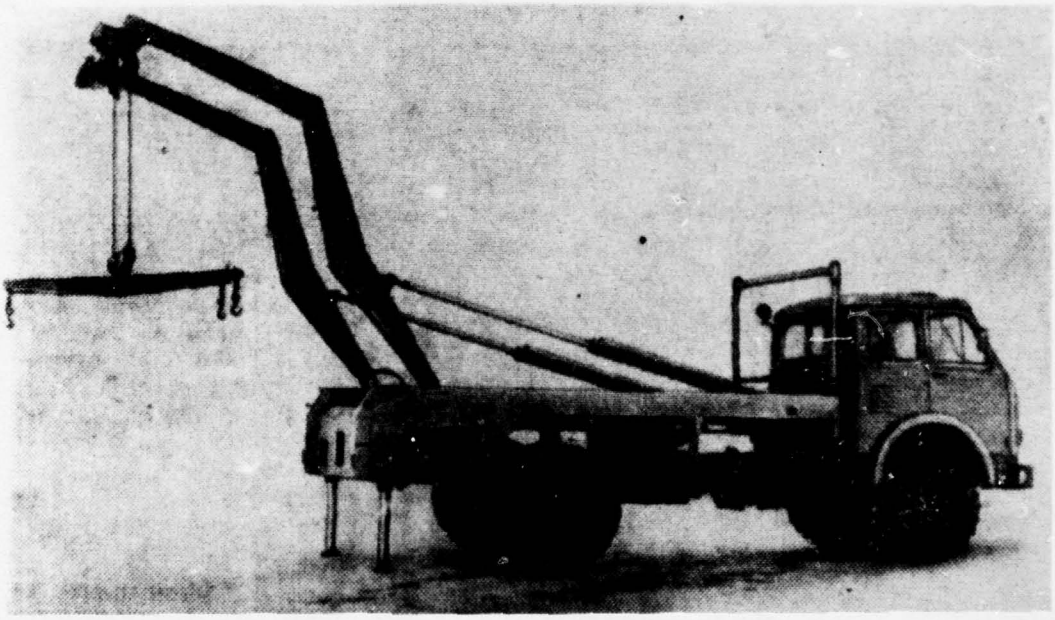

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Figure II-26. Self-loader truck, model 5911

Table II-XV. Characteristics of the Model 5911

Container type handled	Gross 5 t or less
Maximum lifting capacity (t)	5
Lifting time, complete cycle (min)	?
Dimensions of truck bed:	
Length (mm)	7070
Width (mm)	2500
Height (mm)	1400
Height of lifting mechanism (mm)	3300
Weight of lifting mechanism (t)	2
Tires (number)	6
Tire size	12.00x20

c. **Self-loader Truck, Model A-825.** Another Soviet self-loader truck designed specifically for handling their small containers is the model A-825 (fig II-27). This self-loader mechanism, mounted on the chassis of a ZIL-130 vehicle, has a maximum lifting capacity of 1.3 tonnes.

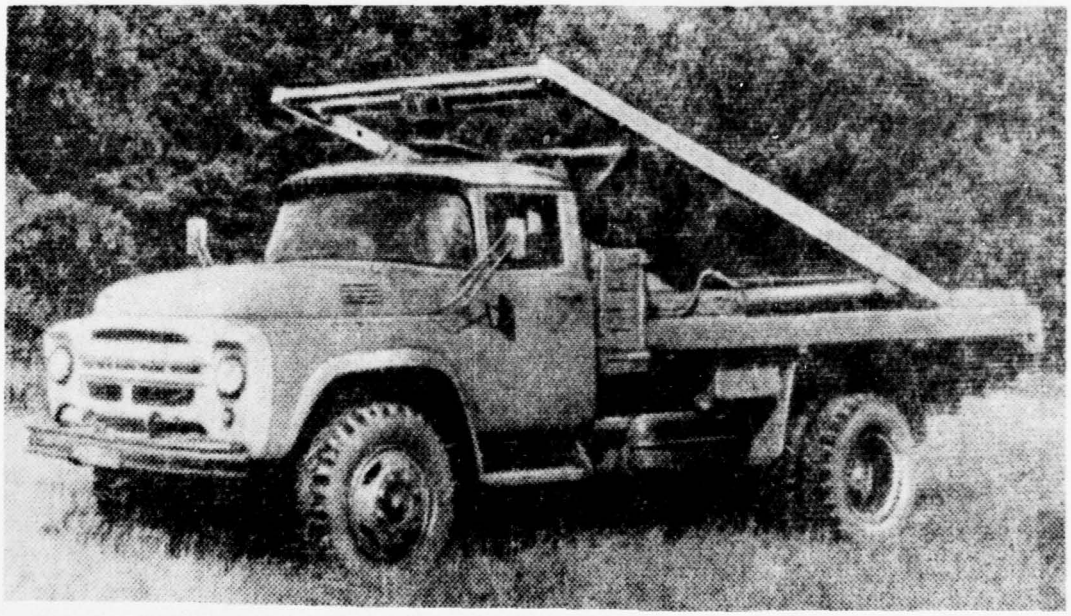

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Figure II-27. Self-loader truck, model A-825

Table II-XVI. Characteristics of the Model A-825

Container type handled	Gross 1.3 t or less
Maximum lifting capacity (t)	1.3
Lifting time, complete cycle (min)	?
Dimensions of truck bed:	
Length (mm)	6740
Width (mm)	2480
Height (mm)	1430
Height of lifting mechanism (mm)	2845
Weight of lifting mechanism (t)	4.8
Tires (number)	6
Tire size	260x20

d. **Self-loader Truck, Model 4902.** The self-loader truck, model 4902, also designed to handle the Soviet small containers, has a maximum lifting capacity of 2.5 tonnes. This self-loader is also mounted on the chassis of a ZIL-130 vehicle.

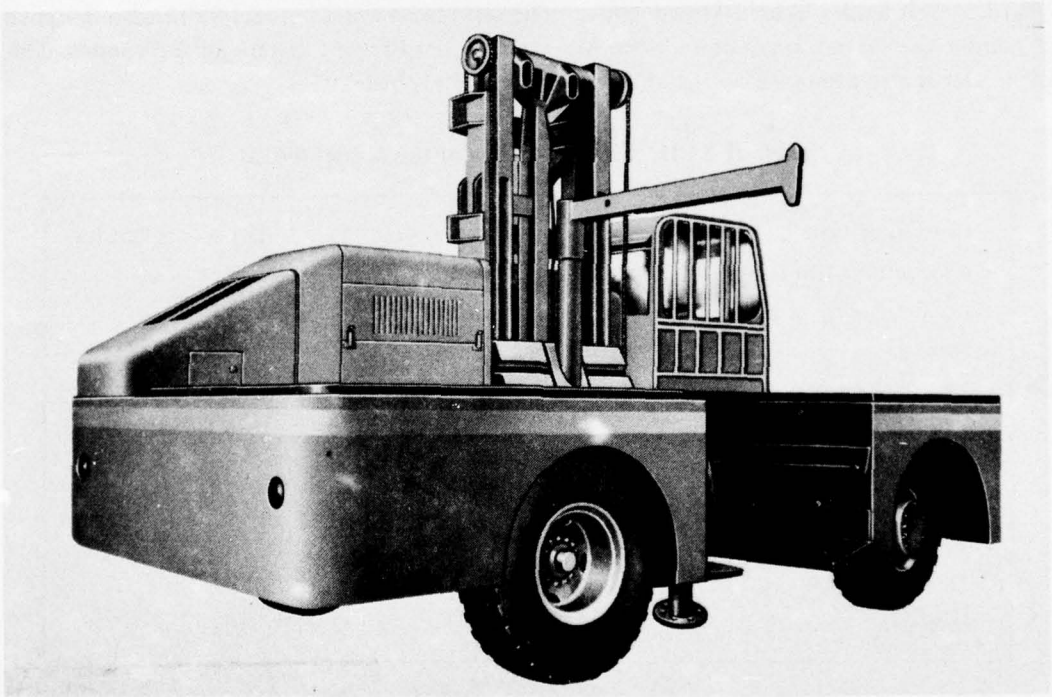
Table II-XVII. Characteristics of the Model 4902

Container type handled	Gross 2.5 t or less
Maximum lifting capacity (t)	2.5
Lifting time, complete cycle (min)	?
Dimensions of truck bed:	
Length (mm)	6650
Width (mm)	2500
Height (mm)	1235
Height of lifting mechanism (mm)	2680
Weight of lifting mechanism (t)	5
Tires (number)	6
Tire size	260x20

15. **Sideloaders**

It is important to reemphasize that the Soviet Union presently is not building sideloader vehicles designed primarily for handling ISO-type containers. Instead, they are purchasing from free world countries sideloader vehicles specifically designed for this purpose. The following Soviet-built sideloader vehicles are all primarily developed for handling long, bulky loads such as pipes and lumber; however, they do have a limited capability to handle some of the Soviet-built small containers. The capacities of these sideloaders range from 3 to 10 tonnes.

a. **Sideloader, Model 4070.** The largest-capacity sideloader vehicle known to be in current production in the Soviet Union currently is the model 4070 (fig II-28), with a maximum rated lifting capacity of 10 tonnes. This sideloader can easily handle all Soviet-built small containers. The model 4070 is also fitted with jacks to stabilize the vehicle when the fork device is fully extended.



Neg. 504035

Figure II-28. Sideloader, model 4070

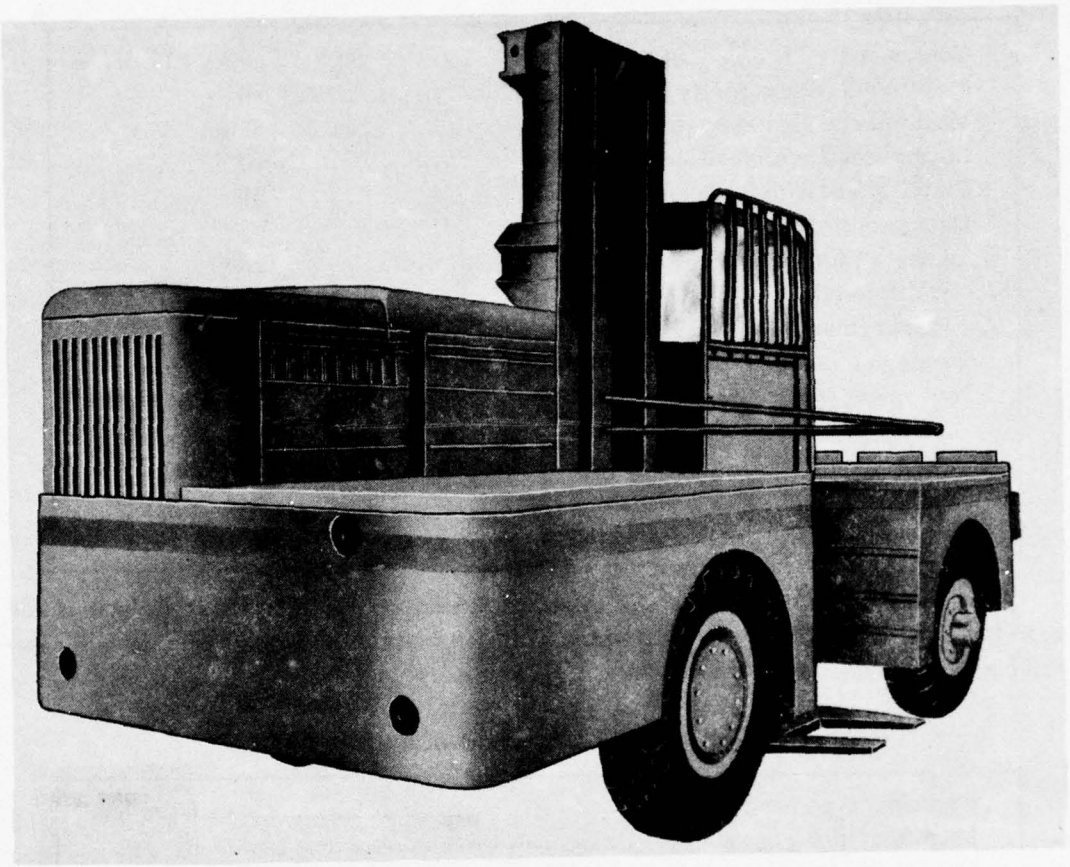
Table II-XVIII. Characteristics of the Model 4070

Container type handled	Gross 10 t or less
Maximum lifting capacity (t)	10
Maximum lifting height (mm)	3400
Lifting speed, with load (m/min)	10
Travel speed, with load (km/h)	35
Dimensions of vehicle:	
Length (mm)	5800
Width (mm)	2800
Height (mm)	3500
Turning radius (mm)	6400
Powerplant (type/rating)	Gasoline 110 kW @ 2600 r/min
Vehicle weight (t)	14.8
Tires (number)	4
Tire size	?

b. **Sideloader, Model M-4065.** Another Soviet-produced sideloader vehicle is the model M-4065 (fig II-29), with a maximum lifting capacity of 5 tonnes. This sideloader also can handle the Soviet small containers.

Table II-XIX. Characteristics of the M-4065

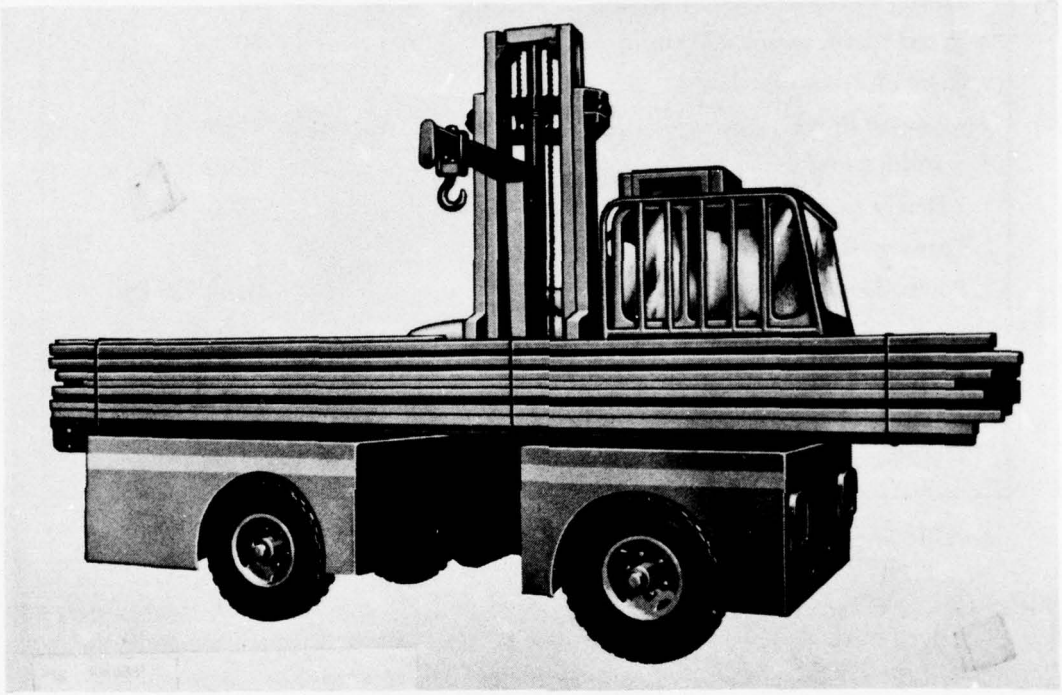
Container type handled	Gross 5 t or less
Maximum lifting capacity (t)	5
Maximum lifting height (mm)	4000
Lifting speed, with load (m/min)	10
Travel speed, with load (km/h)	40
Dimensions of vehicle:	
Length (mm)	4800
Width (mm)	2000
Height (mm)	3250
Turning radius (mm)	4400
Powerplant (type/rating)	Diesel/52 kW @ 2800 r/min
Vehicle weight (t)	6
Tires (number)	4
Tire size	?



Neg. 504081

Figure II-29. Sideloader, model M-4065

c. **Sideloader, Model 4063.** The smallest-capacity sideloader vehicle currently produced by the Soviets is the model 4063 (fig II-30), with a maximum lifting capacity of 3 tonnes. This sideloader can handle only the smallest of their containers.



Neg. 504033

Figure II-30. Sideloader, model 4063

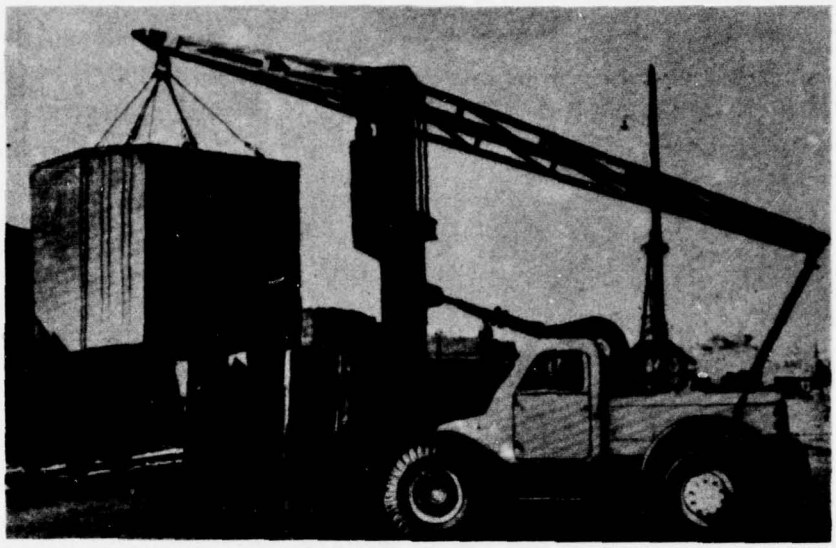
Table II-XX. Characteristics of the Model 4063

Container type handled	Gross 3 t or less
Maximum lifting capacity (t)	3
Maximum lifting height (mm)	4350
Lifting speed, with load (m/min)	10
Travel speed, with load (km/h)	30
Dimensions of vehicle:	
Length (mm)	4580
Width (mm)	2000
Height (mm)	3200
Turning radius (mm)	?
Powerplant (type/rating)	Diesel/30 kW @ 1600 r/min
Vehicle weight (t)	5
Tires (number)	4
Tire size	?

16. **Forklift Trucks**

Although the Soviets probably have the largest overall selection of forklift trucks capable of handling their small-capacity containers, these vehicles are not designed to handle the much larger ISO-type containers. Forklift trucks to meet these requirements would have to be purchased from free world countries such as the United Kingdom and Japan. The Soviets currently have about six forklift trucks that can handle their own series of containers, with lifting capacities ranging from 4.5 to 10 tonnes. Most of these forklift trucks are powered by gasoline engines, but certain models can be fitted with diesel engines. All forklift trucks described in the following paragraphs have a limited rough-terrain capability.

a. **Forklift Truck, Model 4008.** Forklift truck, model 4008 (fig II-31), the largest-capacity forklift truck in the current Soviet inventory, is one of the models known to have been fitted with a boom to increase its container-handling capability. This model has a maximum lifting capacity of 10 tonnes, thus enabling it to handle any of the Soviet small containers.



Neg. 517857

Figure II-31. Forklift truck, model 4008

Table II-XXI. Characteristics of the Model 4008

Container type handled	Gross 10 t or less
Maximum lifting capacity (t)	10
Maximum lifting height (mm)	4500
Lifting speed, with load (m/min)	7
Lifting speed, without load (m/min)	8
Travel speed, with load (km/h)	20
Travel speed, without load (km/h)	36
Dimensions of vehicle:	
Length (mm)	6630
Width (mm)	2700
Height (mm)	2760
Turning radius (mm)	5800
Wheelbase (mm)	2900
Ground clearance (mm)	210
Powerplant (type/rating)	Gasoline/81 kW
Vehicle weight (t)	13
Tires (number)	6
Tire size	12.00x20

b. **Forklift Truck, Model 4045M.** The forklift truck, model 4045M (fig II-32), is one of several with a maximum lifting capacity of 5 tonnes. This forklift truck can handle the Soviet small containers, and with a ground clearance of 240 mm, it would be suitable for limited rough-terrain usage.

Neg. 517775

Figure II-32. Forklift truck, model 4045M

Table II-XXII. Characteristics of the Model 4045M

Container type handled	Gross 5 t or less
Maximum lifting capacity (t)	5
Maximum lifting height (mm)	4000
Lifting speed, with load (m/min)	10
Lifting speed, without load (m/min)	?
Travel speed, with load (km/h)	?
Travel speed, without load (km/h)	?
Dimensions of vehicle:	
Length (mm)	4960
Width (mm)	2250
Height (mm)	3260
Turning radius (mm)	3900
Wheelbase (mm)	2200
Ground clearance (mm)	240
Powerplant (type/rating)	Gasoline/52 kW @ 2800 r/min
Vehicle weight (t)	5.8
Tires (number)	6
Tire size	?

c. **Forklift Truck, Rough-terrain, Model M-4075.** The rough-terrain forklift truck, model M-4075 (fig II-33), has ground clearance higher than that of any other Soviet forklift truck described in this study. With a good rough-terrain capability and a maximum lifting capacity of 5 tonnes, this vehicle would be most useful for military operations in forward areas.

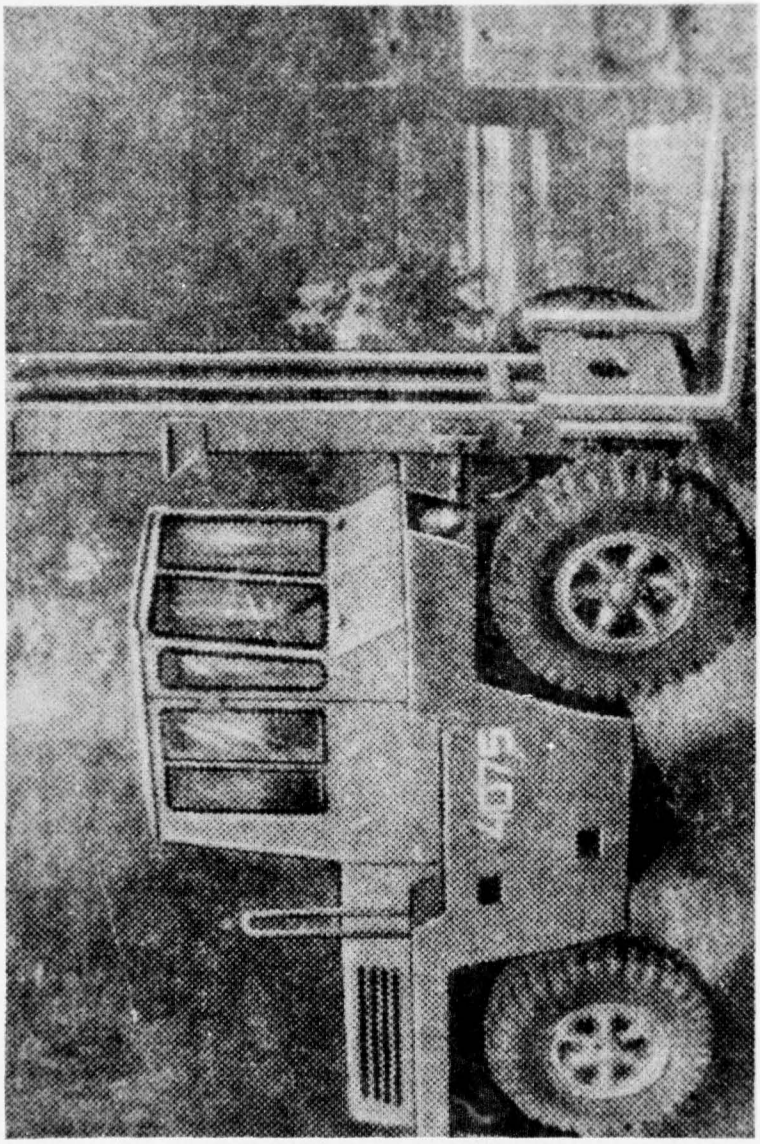


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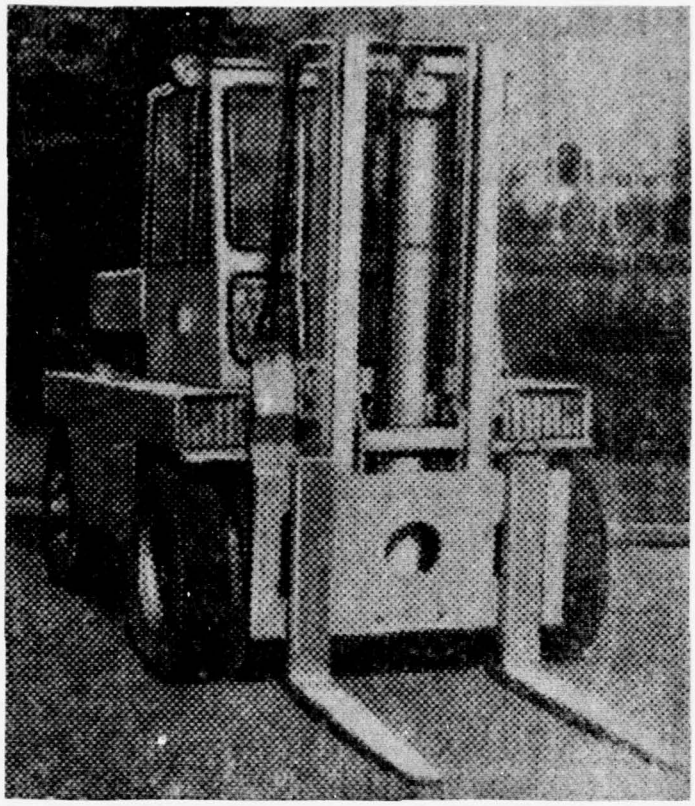
Figure II-33. Forklift truck, rough-terrain, model M-4075

Table II-XXIII. Characteristics of the Model M-4075

Container type handled	Gross 5 t or less
Maximum lifting capacity (t)	5
Maximum lifting height (mm)	4500
Lifting speed, with load (m/min)	10
Lifting speed, without load (m/min)	?
Travel speed, with load (km/h)	?
Travel speed, without load (km/h)	59
Dimensions of vehicle:	
Length (mm)	6300
Width (mm)	2250
Height (mm)	2700
Turning radius (mm)	7200
Wheelbase (mm)	?
Ground clearance (mm)	300
Powerplant (type/rating)	Gasoline/85 kW @ 3200 r/min
Vehicle weight (t)	6.9
Tires (number)	4
Tire size	?

d. **Forklift Truck, Model 4025.** A relatively new Soviet-produced forklift truck is the model 4025 (fig II-34), with a maximum lifting capacity of 5 tonnes. This forklift truck, with a ground clearance of 200 mm, might be employed by the military in light, rough-terrain operations. The model 4025 can handle the Soviet small containers weighing 5 tonnes or less.



Neg. 517876

Figure II-34. Forklift truck, model 4025

Table II-XXIV. Characteristics of the Model 4025

Container type handled	Gross 5 t or less
Maximum lifting capacity (t)	5
Maximum lifting height (mm)	4500
Lifting speed, with load (m/min)	24
Lifting speed, without load (m/min)	?
Travel speed, with load (km/h)	?
Travel speed, without load (km/h)	34
Dimensions of vehicle:	
Length (mm)	4370
Width (mm)	1775
Height (mm)	3280
Turning radius (mm)	3050
Wheelbase (mm)	?
Ground clearance (mm)	200
Powerplant (type/rating)	Gasoline/52 kW @ 2800 r/min
Vehicle weight (t)	7
Tires (number)	6
Tire size	?

e. **Forklift Truck, Model 4045.** Another forklift truck, almost identical in appearance to the model 4045M, is the model 4045 (fig II-35); it also has a similar lifting capacity and container-handling capability. With a ground clearance of 240 mm, the models 4045 and 4045M should have slightly better mobility than the model 4025 in limited rough-terrain environments.

Neg. 504022

Figure II-35. Forklift truck, model 4045

Table II-XXV. Characteristics of the Model 4045

Container type handled	Gross 5 t or less
Maximum lifting capacity (t)	5
Maximum lifting height (mm)	4000
Lifting speed, with load (m/min)	10
Lifting speed, without load (m/min)	?
Travel speed, with load (km/h)	20
Travel speed, without load (km/h)	36
Dimensions of vehicle:	
Length (mm)	4990
Width (mm)	2250
Height (mm)	3260
Turning radius (mm)	3700
Wheelbase (mm)	2200
Ground clearance (mm)	240
Powerplant (type/rating)	Gasoline/52 kW
Vehicle weight (t)	5.6
Tires (number)	6
Tire size	(front) 8.25x20
	(rear) 8.25x15

f. **Forklift Truck, Model M-4006.** The model M-4006, with a lifting capacity of 4.5 tonnes, is probably one of the Soviet Union's oldest forklift trucks. In spite of its age, this vehicle, which can be fitted with a boom to enhance its ability to lift Soviet small containers, is quite versatile. With a ground clearance of 240 mm, it also has a limited rough-terrain potential.

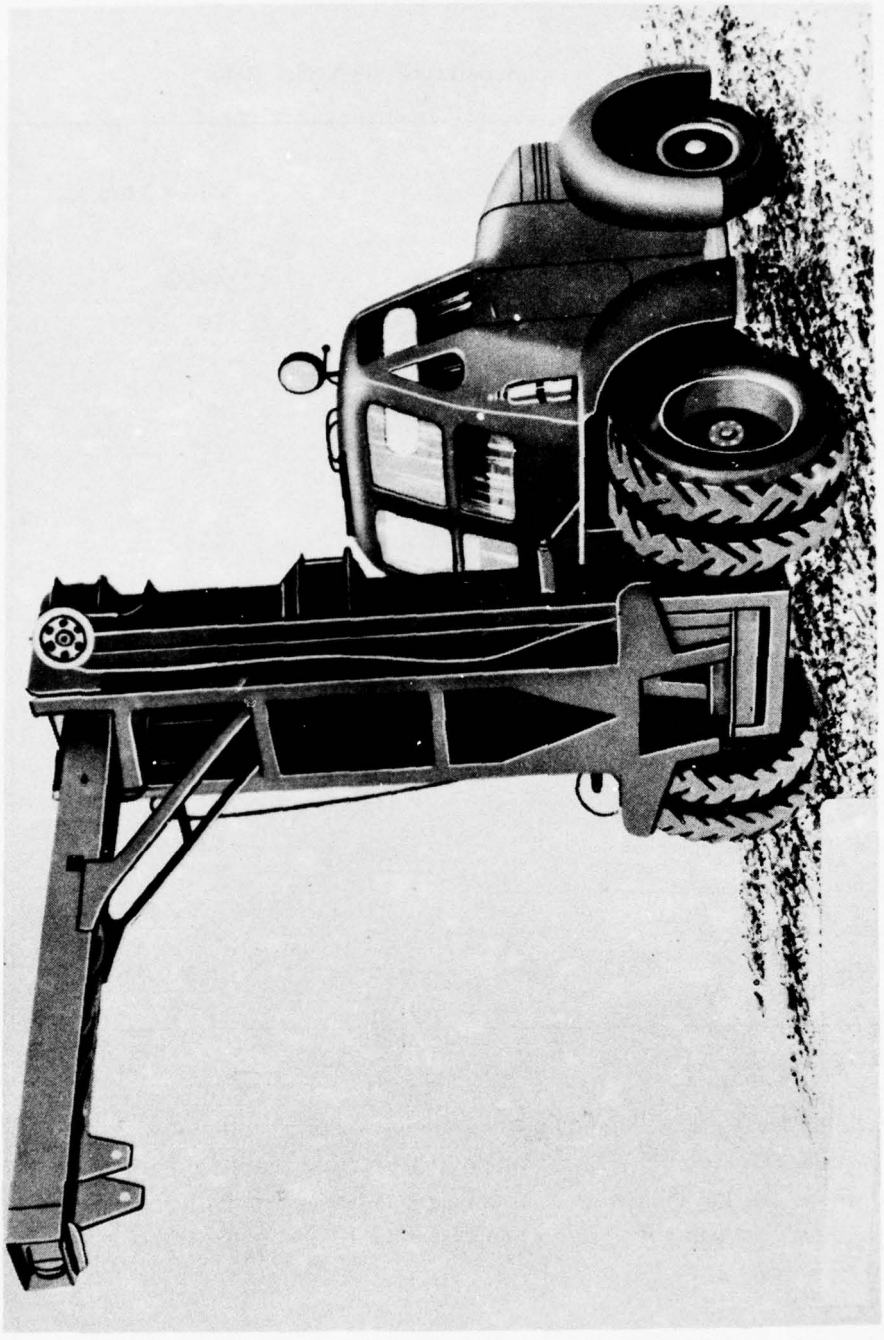


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Figure II-36. Forklift truck, model M-4006

Table II-XXVI. Characteristics of the Model M-4006

Container type handled	Gross 4.5 t or less
Maximum lifting capacity (t)	4.5
Maximum lifting height (mm)	4100
Lifting speed, with load (m/min)	10
Lifting speed, without load (m/min)	?
Travel speed, with load (km/h)	36
Travel speed, without load (km/h)	?
Dimensions of vehicle:	
Length (mm)	6900
Width (mm)	2400
Height (mm)	3400
Turning radius (mm)	4750
Wheelbase (mm)	2600
Ground clearance (mm)	240
Powerplant (type/rating)	Gasoline/52 kW
Vehicle weight (t)	7.8
Tires (number)	6
Tire size	?

D. BULGARIA

17. General

a. Bulgaria is known as the leader among the Communist countries in the overall area of materials-handling equipment development and production. Their capabilities are particularly evident in the area of forklift trucks, especially electrically driven models. The major developer and producer of this equipment is the state-owned manufacturer, Balkancar, which markets its products in 60 different countries. Significantly, the Bulgarians are not making any effort to design and produce advanced container-handling equipment;

their progress in this area is basically limited to the production of auxiliary equipment. They, like several other ECC, have developed a set of four container-handling jacks (designated model 9800), which will be described in detail later in this section.

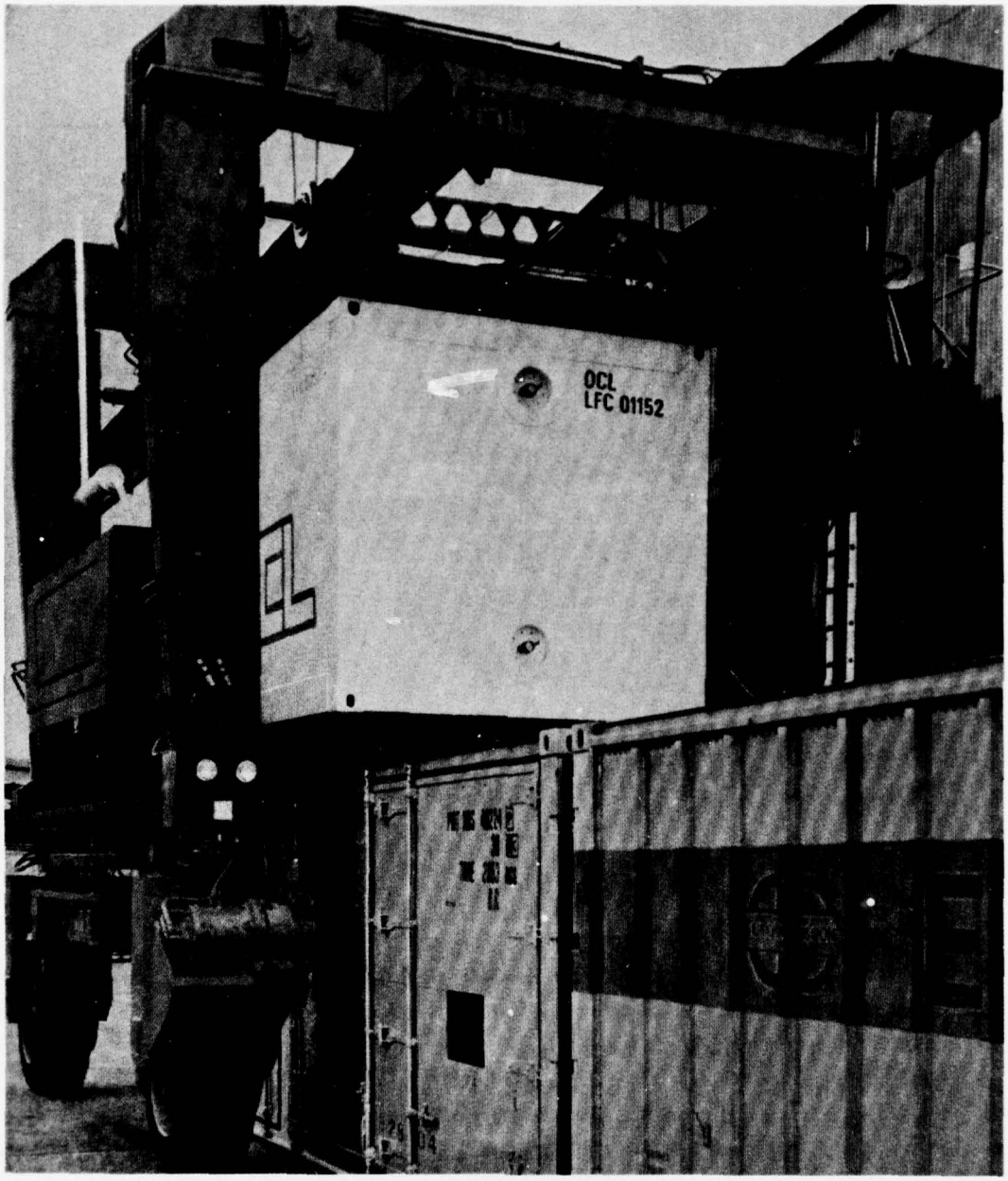
b. Bulgaria's ability to handle the various sizes of ISO containers is primarily attributable to technology transfer from the United Kingdom. The UK firm of Rubery Owen has granted Balkancar a license to build three different models of Rubery Owen's container stacker-transporters. These container-handling vehicles are primarily designed for use in the port areas and inland container terminals. One of the models can stack containers two high, and the other models can stack three high. All models have a maximum lifting capacity of 30.5 tonnes. In addition to manufacturing these vehicles for their own use, the Bulgarians are also selling them to other Communist countries.

c. Some small-capacity non-standard ISO containers are known to be used throughout Bulgaria, but Bulgaria employs non-standard containers much less than the USSR. They are currently using increasing numbers of ISO containers of various sizes, and this trend will continue, thus expanding the need for more equipment capable of handling them. Since the overall role of the small non-standard ISO containers is not significant in Bulgaria, no attempt will be made to describe the few forklift trucks that can handle them.

18. **Container Stacker-transporters (*Straddle Carriers*)**

Container stacker-transporters, sometimes referred to as straddle carriers or saddle wagons, are presently the predominant type of container-handling equipment in Bulgaria. These vehicles are used primarily in the port areas and inland container terminals. Significant features include ability to straddle rail flatcars and semitrailers and stack containers two and three high and availability of all-wheel steering to reduce the turning radius. The only models of these vehicles known to be in current use in Bulgaria were either bought from the United Kingdom or built in Bulgaria under UK license.

a. **Container Stacker-transporter, Balkancar Model 3042CBB.** The container stacker-transporter, model 3042CBB (fig II-37), designed to handle ISO containers types 1A, 1B, and 1C, has a maximum lifting capacity of 30.5 tonnes. This vehicle can stack containers two high, but it can transport only one container at a time. The model 3042CBB has all-wheel drive and steering and is equipped with dual diesel engines; if one engine fails, the vehicle will have a backup power source. This vehicle is primarily employed to handle containers in port areas and inland container terminals. A breakdown of the model designator indicates the following: the first two digits (30) indicate the maximum lifting capacity of the transporter, the third digit (4) shows that the vehicle has four wheels, and the fourth digit (2) indicates that the transporter can stack containers in stacks two high.



Neg. 520511

Figure II-37. Container stacker-transporter, Balkancar, model 3042CBB

Table II-XXVII. Characteristics of the Model 3042CBB

Container types handled	1A, 1B, 1C
Maximum lifting capacity (t)	30.5
Maximum lifting height (mm)	5820
Lifting speed (m/min)	9
Vehicle travel speed (km/h)	24
Dimensions of vehicle:	
Length (mm)	9030
Width (mm)	4900
Height (mm)	7440
Turning radius (mm)	10 290
Wheelbase (mm)	5640
Powerplant (type/rating)	Diesel/76 kW @ 2250 r/min
Vehicle weight (t)	30.8
Tires (number)	4
Tire size	?

b. **Container Stacker-transporter, Balkancar Model 3043CBB.** Another container stacker-transporter, similar in appearance and performance characteristics to the model 3042CBB, is the model 3043CBB (fig II-38). The primary difference is that the model 3043CBB can stack containers three high. Also designed to handle ISO containers types 1A, 1B, and 1C, it has a maximum lifting capacity of 30.5 tonnes. The model 3043CBB is also used for container-handling operations in port areas and inland container terminals.

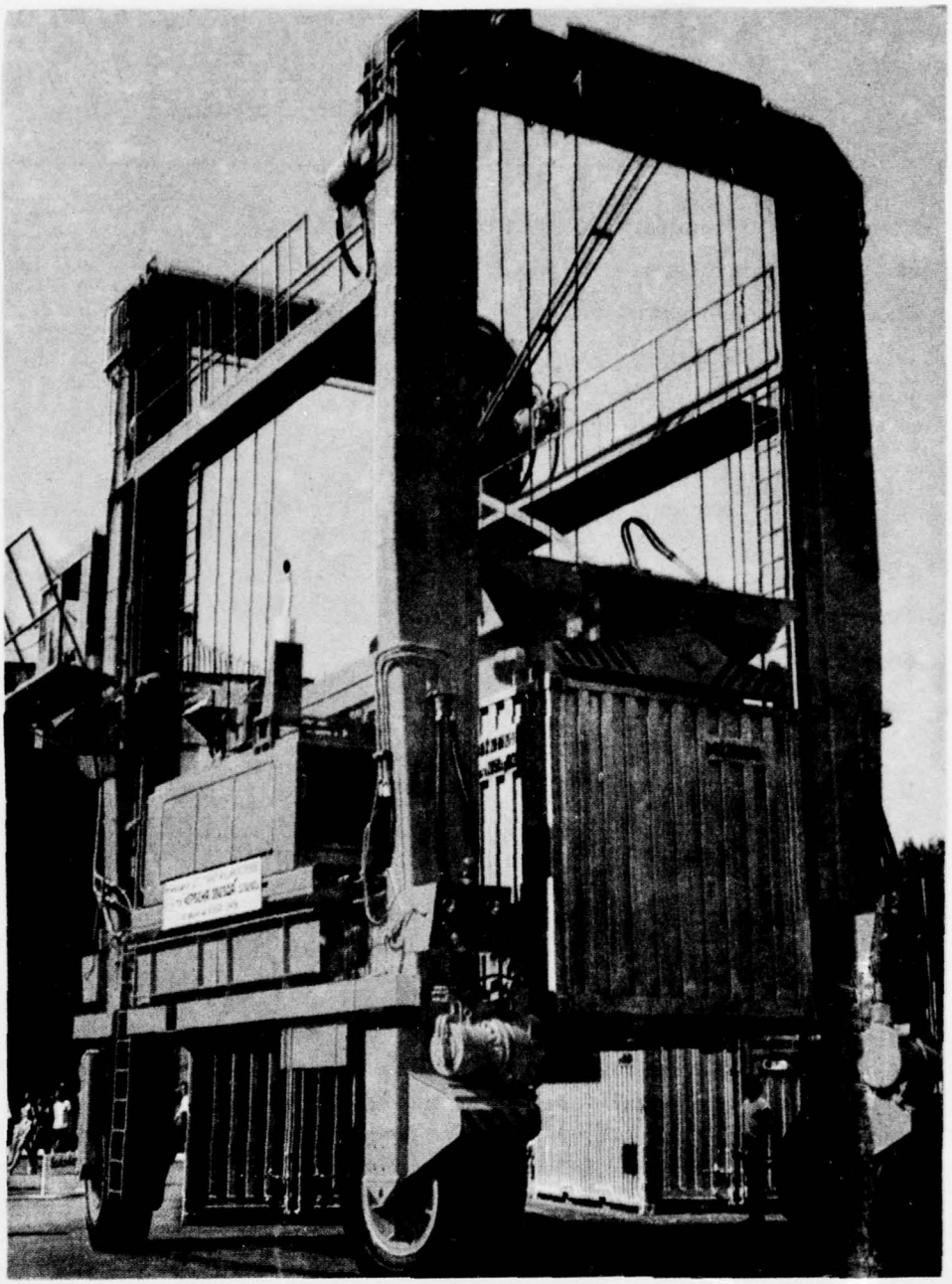


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Figure II-38. Container stacker-transporter, Balkancar, model 3043CBB

Table II-XXVIII. Characteristics of the Model 3043CBB

Container types handled	1A, 1B, 1C
Maximum lifting capacity (t)	30.5
Maximum lifting height (mm)	7980
Lifting speed (m/min)	9
Vehicle travel speed (km/h)	24
Dimensions of vehicle:	
Length (mm)	9030
Width (mm)	4900
Height (mm)	9680
Turning radius (mm)	10 290
Wheelbase (mm)	5640
Powerplant (type/rating)	Diesel/76 kW @ 2250 r/min
Vehicle weight (t)	33.5
Tires (number)	4
Tire size	?

c. **Container Stacker-transporter, Balkancar Model 3083CBB.** The model 3083CBB (fig II-39) is the third container stacker-transporter being manufactured in Bulgaria under license from the United Kingdom. This model differs from the others primarily in its eight-tire configuration, which facilitates its use on "softer" ground or uneven terrain and on semi-improved roads in terminals or yards. The model 3083CBB is also designed to stack containers three high and can handle ISO containers types 1A, 1B, and 1C. Information on the technical characteristics of this model is currently unavailable, but its technical characteristics are probably about the same as for the other two models. The only exceptions would be the wheelbase and the net weight of the vehicle.

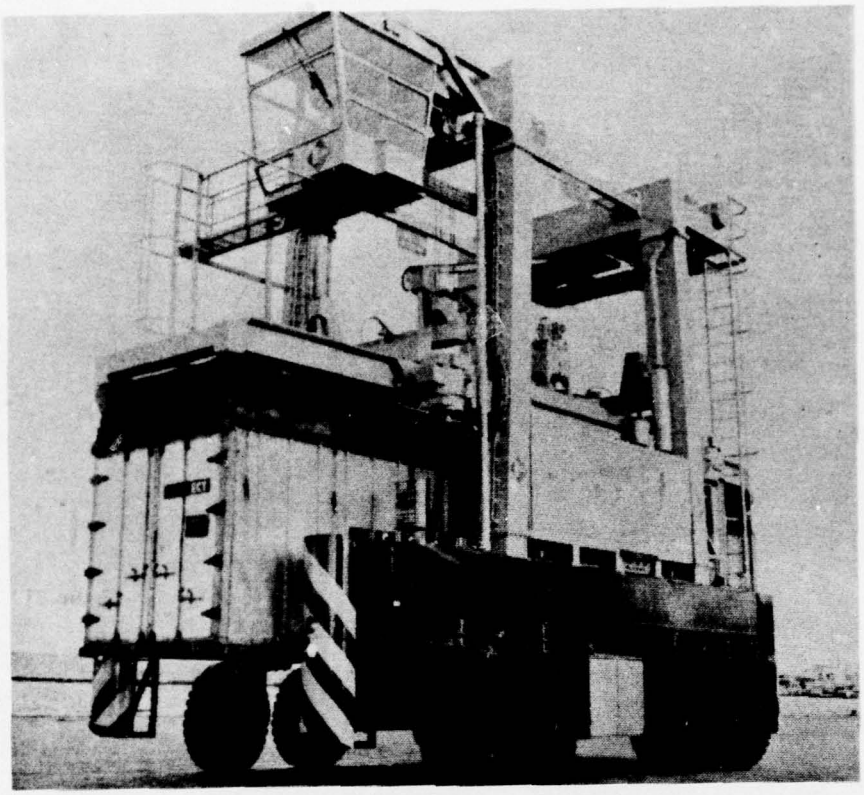

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Figure II-39. Container stacker-transporter, Balkancar, model 3083CBB

19. Auxiliary Container-handling Equipment

Auxiliary container-handling equipment includes smaller, more portable items (such as jacking devices) placed at the corners of the container to lift it from the trailer. This type of equipment may be most feasible for military use in the field, to unload containers from trailers not equipped with built-on handling equipment.

a. **Container-lifting Jacks, Balkancar Model 9800.** Balkancar has developed a set of four jacks for use in lifting various types of ISO containers. The jacks, designated model 9800 (fig II-40 and II-41), have a maximum combined lifting capacity of 20 tonnes and a maximum lifting height of 1700 mm. The jacks are operated by hydraulic pressure supplied from a power source in a console that also controls the operation of the jacks. These jack devices would be most useful to the Bulgarian military for unloading ISO containers from semitrailers in forward areas.

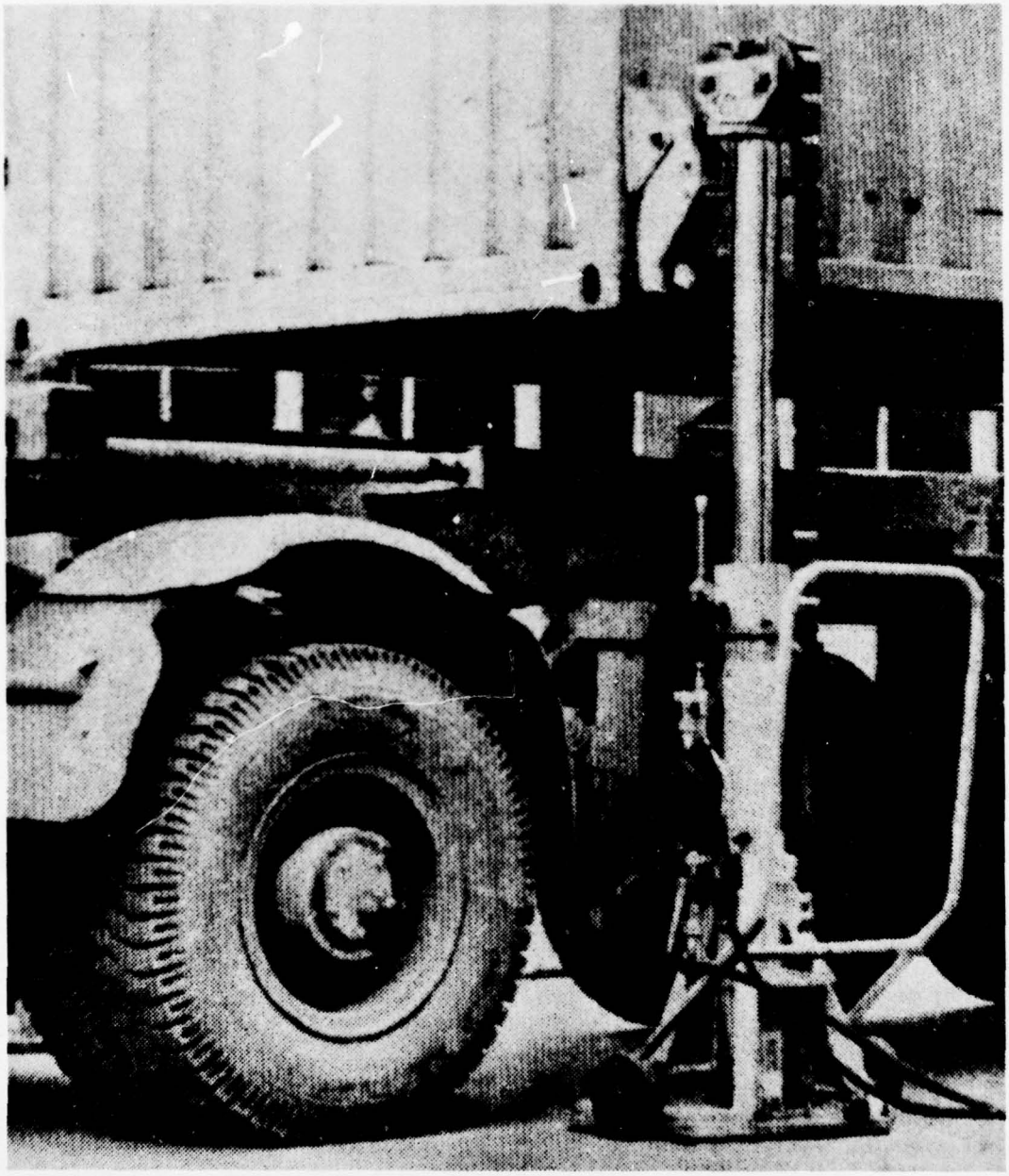

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Figure II-40. Container-lifting jacks, Balkancar, model 9800 (view a)

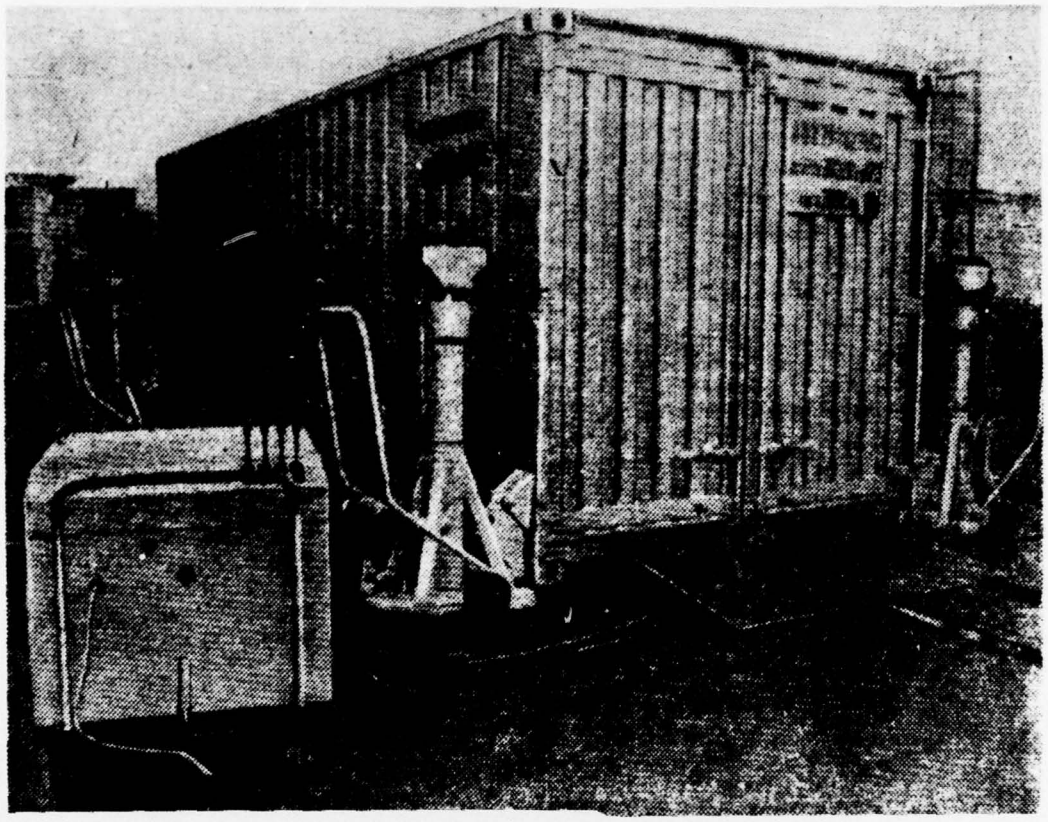

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Figure II-41. Container-lifting jacks, Balkancar, model 9800 (view b)

E. HUNGARY

20. General

a. ISO containers are in relatively wide use in Hungary, particularly the type 1C, which is generally accepted throughout the ECC as the standard container for the shipment of goods. In the early 1970s, the Hungarians began planning and implementing plans to develop equipment and procedures adequate to handle ISO containers. These plans called for either manufacturing or purchasing handling-equipment compatible with the various sizes of ISO containers. The Hungarians can produce some of the required equipment, but their rapidly expanding use of the type 1C ISO container exceeded their capability to develop and produce the necessary handling equipment. As a result, they have had to turn to other sources to meet their needs.

b. Hungarian industry can produce container-handling equipment for the various sizes of ISO containers and semitrailers that can transport the type 1C container. Although no current information indicates that they are equipping any of their semitrailers with self-loader mechanisms, they do have access to the technology necessary to build such devices. The Hungarians are known to be manufacturing jack-type devices for lifting containers from semitrailers, but the technical characteristics and model designators of these devices are currently unknown.

21. **Purchases From Other Countries**

The Hungarians are known to have purchased a number of the UK-produced Lancer Boss, model 2500, sideloader vehicles, with a rated lifting capacity of 25 tonnes. The Hungarians also reportedly purchased some West German-produced Klausmobile self-loader container transporters. The West German Klausmobile model, which can lift either a single type 1A container, or two joined type 1C containers, has a rated lifting capacity of 40 tonnes.

F. POLAND

22. **General**

a. Poland also uses ISO containers extensively to ship containerized goods. The ISO type 1C container appears to be the most widely used within Poland (as is the case in most ECC). Current sources indicate that the Poles rely heavily on other Communist countries and free world countries for most of the equipment they use in their container-handling operations. Apparently, they are not exerting any major effort to develop and produce specialized container-handling equipment of their own.

b. Poland has been developing and producing materials-handling equipment for many years, but this equipment has been limited primarily to forklift trucks of relatively small capacity. With the large selection of container-handling devices available from other sources, the Poles will probably not attempt to develop and manufacture their own equipment.

23. **Purchases From Other Countries**

Like the Hungarians, the Poles have purchased a number of the UK-produced Lancer Boss, model 3500, sideloader vehicles, with a rated lifting capacity of 35 tonnes. They have also purchased some Italian-produced Battoni, model SL-25, sideloader vehicles, with a rated

lifting capacity of 25 tonnes. Open press sources indicate that the Poles are currently employing East German-manufactured container-handling equipment, such as the self-loader container transporter, model CKS 20000, and the container stacker-transporter, model DFT 20002 C1. Finland has supplied the Poles with several different models of their container gantry cranes for use in the port areas, and Poland is also known to be purchasing container-handling equipment from Japan and West Germany.

G. YUGOSLAVIA

24. General

Yugoslavia has also become involved in the containerization "revolution" that has been rapidly expanding over the last few years within the ECC. As has been the case with the other ECC, the ISO type 1C is now the most widely used container within Yugoslavia. Although information is limited, most reports indicate that Yugoslavia apparently relies primarily on other countries for the bulk of their container-handling equipment.

25. Present Production and Future Prospects

Yugoslav production of materials-handling equipment has generally been confined to forklift trucks, most of which are diesel powered and lack sufficient capacity to handle any of the standard-size ISO containers. The Yugoslavs probably will not exert any major efforts to develop and produce their own specialized container-handling equipment. Instead, they will rely on other countries to supply the equipment required to keep pace with the increasing use of ISO containers.

H. ROMANIA

26. General

Information on Romania's container-handling equipment capability is also somewhat limited. The Romanians are known to be using the type 1C ISO container (and they may also be using the types 1A and 1B). Information is inadequate to assess the extent to which they are relying on other countries for container-handling equipment.

27. Production of Traveling Cranes, Sideloaders, and Forklifts

An open press source (November 1974) reported that the Mechanical Engineering Factory in Timisoara had manufactured more than 900 traveling cranes, with lifting capacities up to 35 tonnes. This factory is also reported to be manufacturing sideloader vehicles and forklift trucks, but the lifting capacities of these devices were not reported. This information indicates that the Romanians may have a relatively advanced capability to produce some of their own container-handling equipment.

I. PEOPLE'S REPUBLIC OF CHINA (PRC)

28. General

The PRC appears to be the last of the ECC to begin to use ISO-type containers. This late start undoubtedly results from their overall technical deficiencies in past decades, but they must now adopt new technology in this area to keep pace with the rest of the world. Little is known of the type or types of Chinese equipment used to handle the ISO-type containers, and this is considered an intelligence gap.

29. Equipment in Use

They have some large portal cranes of their own manufacture located in some port facilities, and these devices can handle various sizes of ISO containers. An open press source reported that the Chinese are currently using the ISO type 1C container on an experimental basis. This same source indicated that the Chinese will probably attempt to build container-handling equipment of their own; however, with the availability of sufficient equipment on the free world market, this does not seem likely.

J. TRENDS AND FORECAST

Although the ECC will attempt to improve their capability to handle various sizes of ISO-type containers, they will continue to rely on free world sources for certain types of equipment. Some significant progress is anticipated in East Germany, Czechoslovakia, the Soviet Union, and Bulgaria (which currently have a well-developed capability to develop and manufacture container-handling equipment). Within the next 5 years, the Soviet Union will make the most significant gains. A Soviet open press source reported that the USSR has designed and is starting to produce a container stacker-transporter similar to that currently used in free world countries. This new vehicle, designated "PaK," probably will be

employed in port areas and inland container terminals. It will be able to stack containers, and its anticipated maximum lifting capacity is approximately 30 tonnes. A Moscow broadcast reported that the Minsk Motor Vehicle Works has produced the Soviet Union's first container-carrying truck, designated SU-W840-A-1. The vehicle reportedly has a maximum capacity of 32 tonnes and can handle two types of ISO containers. Serial production is to start within the next 5 years. Czechoslovakia is planning to produce another container portal crane in the "FD" series, with a maximum lifting capacity of 32 tonnes. This will give them a mobile portal crane capable of handling the ISO type 1B container.

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